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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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ARE WE A MILITARY PEOPLE? *

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WHENEVER discussions that hinge upon the point of the military capacity of governments, arise, the most natural tendency is to compare from military standpoints one people with another, especially as regards organizations and armament. In such comparisons of military establishments, the United States, of course, is always at a disadvantage and it is then that some apologists seem to take refuge in the comforting reflection that we are what we are, because we are not a military nation. Oddly enough this idea has been so commonly asserted and accepted that it passes at home and abroad, largely, if not wholly, as a current fact, which is seldom disputed, even amongst ourselves, and for which alleged fact mortification or excuse seems not to be deemed at all necessary. Indeed, it is the boast of some political theorists, that our gigantic progress as a nation, our achievements in agriculture, commerce and the trades, are mainly due to the fact that our people have been untrammelled by those military compul-

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sions so dreaded and hated in the older countries—a theory possessing certain elements of truth, yet it would nevertheless seem to be a sound principle of political economy, that the fruits of labor should be reasonably secure under all conditions likely to arise. Surely that country most desirous of peace, most opposed to war, best deserves peace and avoids war, by being ever ready to meet the most formidable foe. A people prepared to fight in defense of national honor, property, home and right, need not fight except when honor, home and right are actually attacked, and then fighting becomes the most sacred reciprocal obligation of government and citizen, to which each should lend fullest support. But these are well recognized political axioms.

Now aside from the question whether we really suffer by comparison in respect to our military system, or the lack of it, if it be intended to assert only that we are not a military nation, to this proposition there can be no dissent, for in the light of facts and history it must be admitted that we are not. But if the term military nation is meant to indicate that we are not a military *people*, then it is time that issue should be joined.

A military nation, strictly speaking, is one that fosters, encourages and maintains at all hazards a strong and ever-ready military force to which every peaceful interest of the citizen is subordinated. Of course we are not that. On the contrary, so far as the State itself is concerned, it has manifested little, if any, tendency in the direction of military purpose or ambition. Therefore, it goes without saying that we are not a military nation in the generally accepted interpretation of that term. But a military people we are, always have been, and bid fair always to be. As a nation, except in the emergency of war, less has been done to stimulate the military tendencies of our people, and still less to formulate any uniform plan for military organization, than in almost any other government in the world. On the contrary, we have had preached to us since the days of the Declaration of Independence, doctrines most emphatically opposed to a standing military establishment, and, despite the obligations imposed by the Constitution, the Government has persistently neglected the organization by law of the military bodies within the States. Indeed, this apparent

aversion to a military establishment, based as it was upon early experiences in our history, seems to have furnished some ready leaders of a narrow political school, opportunity and pretext for the fallacious doctrine that the theory and principles of our Government were from the beginning opposed to a military establishment of any kind. Despite this doctrine, however, it must be admitted by those who read the Constitution of the United States that Congress was vested with fullest powers "To raise and support armies" and to provide for organizing, arming and disciplining militia to an extent not limited. That same instrument made the President the Commander-in-chief of the Army and Navy of the United States and of the militia of the States when called into the service of the United States, all of which provisions clearly showing that even the makers of our constitutional laws foresaw necessities to which their successors have been largely blind. As far back as 1792, when the first militia law was enacted as a Constitutional Amendment, it was proclaimed that "A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed." Every able-bodied citizen between the ages of 18 and 45 was required to be enrolled as a militiaman and every citizen after notice of his enrollment was required to be provided at his own expense with the necessary implements of war of his grade, which were guaranteed against every action of debt and guarded by the law as the most sacred possession of the citizen. That law, although a dead letter, still remains in force, and ever since the time of its enactment the citizen when called upon has carefully kept faith with the Government. There are men to-day who possess as heirlooms the weapons which their ancestors used on the battle-fields of the Revolution, and the most sacred memories of some cluster around the antiquated flint-lock which some ancestor purchased for himself under the law of 1792.

But despite every doctrine of government, despite all the inherited antimilitary theories and prejudices of the few, despite all the fallacies of statecraft and the petty purposes of politicians, our people have constantly maintained their natural military instincts, characteristics and nature, which made them as quick and as willing to go voluntarily to the front in '61

and '63, when called out by the President, as they did in 1776, when without a call of government, they hastened to the defense of a common cause. Of course there are some, indeed there are many, who will dispute this assertion, but it will do no harm to discuss the matter, especially at a time when certain bellicose nations of the old world threaten us, and the periodical strike of a horde of angry foreign-born citizens has but recently been averted.

In answer then to the caption query, it may be asserted that we are a military people naturally and physiologically, with a strong natural admiration for soldiers and that deep-rooted fondness for martial music which enslaves our nerves and muscles, and exercises them involuntarily. Note the crowds of all ages, sexes, and conditions, that follow the military processions through the streets of our cities. Recall, if you please, the interstate military contests which people throng to witness and note the hurrahs of welcome that greet the return of the winners of the prize drill cups. Search the records of Congress and count the many unanswered petitions of the people for more tents and more guns for their citizen soldiers, and examine the many half-considered, half-matured schemes for militia organizations that die because of feelings and opinions not shared by the people.

Glance back again to the statute books and discover that the only law providing for military mobilization in time of war was the law enacted 105 years ago. Under that law the militiamen, if armed and equipped as therein provided, and as is still prescribed, the volunteer militiaman would become the guy of the streets. Think of a modern people governed by a law which provides for the ludicrous spectacle of a dragoon with a brace of flint-lock pistols and pistol holsters covered with bear skin, or riflemen, armed with flint-lock muskets and carrying bullet pouches and powder-horns; yet such is the provision of the unrepealed militia law, which, if literally obeyed as laws should be obeyed; would send an army into the field, as if arisen from a century old grave. Not only that, but this same militia law provides that each regiment shall consist of two battalions, each battalion to be composed of five companies, a tactical organization cast aside in this country generations ago.

If then our people, with so little encouragement from the State have maintained the military instinct intact, how much greater must be their capacity and natural aptitude for military service than those people of the so-called warlike nations of the old world, where compulsory military service is the common burden of citizenship from ages varying from 17 to 45. In Germany, for example, that so-called model military nation of the world, the laws of compulsory military service—which the compiler tells us are among the mildest in Europe—in 1895, out of 437,000 young men registered, required 228,000 to fill the annual military contingents. Is it any wonder that in that country military laws become the bugbear of citizenship and drive thousands of people annually into exile to escape military service? Unlike Germany, the United States, aside from its small Regular army, appropriates only \$400,000 a year with which to arm and equip the State militia, and which if divided as contemplated, according to the pro rata representation in Congress, would be distributed among less than 50,000 men—not enough money, by the way, to buy a half rifle per man. Yet the Army Register shows 112,000 uniformed militiamen. How many more there would be if the increased appropriations so often asked for were made, could only be ascertained after the fourteen millions of arms-bearing citizens had been made aware of the new opportunity for additional organizations. To keep alive their martial spirit, Germany, France, Russia, and other military nations, essay to fan the flames of military enthusiasm by huge mobilizations and gigantic reviews. In Europe the enforced military service snatches men away from their business and their homes at great personal sacrifice to join in demonstrations and display of possible military power. But when war comes are Germans, or Frenchmen, or any other people, one bit more quick or ready than Americans to shoulder the rifle and assemble at the front? What general of modern times has commanded an army of a million volunteer soldiers such as Grant commanded when he was four years younger than either Wellington or Napoleon on the field of Waterloo? What people in bivouac or battle ever evinced greater endurance, greater forbearance, or more persistent purpose, than the men who fought in the War of the Secession? And yet they

are the people who thus suffered, the people whom some of us are wont to say are not military. They are the people whose natural martial spirit the National Government refuses or neglects to encourage in time of peace. That war cost the Union six thousand millions in money debt, the death of 359,496 persons, the wounding of 246,712 others, and the treatment in hospitals for diseases of over six million men.

It may not be improper now to inquire into the cause of this governmental apathy as regards our military establishment.

This Government was, of course, founded on a theory, or it might be more proper to say, was founded on principles. The chief of all other principles was the segregation of all rights of citizenship within the single citizen. Out of that principle of investing the single citizen with the right of self-government, was developed the theory of citizen sovereignty and the anomalous creed that the subject is the master of the ruler. All of these notions of a government "Of the people, for the people and by the people," were the natural results of the age of revolution and reform, when a pioneer people, seeking liberty and happiness in a new country, being still pursued by the jealous authority of the mother country, rebelled against what they regarded as an assumption of powers and the invasion of rights. When the conflict was precipitated by the incident occurring in Boston Harbor, naturally the military arm of the home government was exercised. At that time there was little or no military organization in this new country, but there suddenly sprang into existence a legion of fighting men—a legion of arms-bearing citizens—an untutored legion wherein every man was a tactical unit and a tactical leader of himself in action. But what child in the land has not felt his blood boil when reading the accounts of the murderous assaults of the British, and the forbearance practiced by our patriots before there was military organization enough to fight that immortal battle of Lexington. Naturally the arrogant British military were regarded as instruments of the despotic King ruler. To the new liberty loving people, the military was the only power which could effectually deny them their rights, and not even after they had gained their independence and established their complete national autonomy, did political agitation permit them to forget the alleged dangers of a

permanent military arm, and this, too, in spite of the constitutional provisions for an American army. Then and ever afterwards, when good Americans seemed likely to remember that had it not been for the little army suddenly organized to withstand the English onslaught, National American Independence could not have been achieved, and that national strength was to be found chiefly, if not alone, in the developed war capacity of a nation, the cry of the politician, the creature whose cry is always to the passions and prejudices of man, was "Down with the standing army." From that time on the political doctrine was preached by the professional politicians that because England had an army which had at times, especially under the Stuarts, threatened the destruction of the rights of Britons and later was counted a threatening menace to the colonial rights of Americans, therefore our country, even after the establishment of our infant national government, should never maintain an army of its own.

Even some of the most patriotic Americans imbibed this idea, which after all was a tradition borrowed from England in her earlier and weaker days when the King of England, James I., proclaimed the divine right of kings, and parliament asserted the people's right to representation in government as the birthright of the subjects of England.

A glance at English history will show how strong and lasting was this prejudice of the people, born of that conflict between the king and his army on one side, and the people and their representatives on the other. For example, the deep-rooted opposition of parliament to the housing of British soldiers in times of peace, shows the constancy and extent of the people's former dread of the military power. The efforts to establish a permanent barrack system in England show that up to the beginning of the present century, the English people themselves were so afraid of the alleged menace of the military that not all the eloquence of the renowned William Pitt could induce parliament to authorize the expenditure of any money for the housing of English troops, which, by the way, was postponed until 1801. Indeed, it was one of the usurpations of power of that ready statesman, for which happily he was never called to account, that the first money which was placed at the disposal

of the Barrack-Master-General was money appropriated for a different purpose. But England, at least since the days of Charles I., has never found any real menace in her modern military or need of another Cromwell. On the contrary, she has prospered and grown strong under its zealous and patriotic watchfulness. In the beginning she was afraid to allow her noble gentry to officer her battalions, lest they as representatives of royalty, might use their power for ends of rivalry and usurpation. Subsequently, seeming to realize that there was danger in allowing her lower classes to hold the military power, lest another obscure captain should develop into another dangerous Cromwell, she changed back again to those who had in the beginning been regarded as the natural leaders of her army.

In times past the evils of military power were necessary evils, and a student of social evolution must conclude that powers could only be first established by force, and that all government is necessarily of military origin. Among the savages and primitive races the strongest man by his own powers became chief, and the strongest clan governed the tribe. In the beginning force alone could rule, and all early governments were developed by the strongest fighting elements. Naturally too the earlier governments were all more or less transitory and experimental, for it was a struggle for the survival of the fittest. For example, the Greek City States, as Benjamin Kidd expressed it, were essentially units, each cherishing its own independence, and as a rule, seldom remaining long free from war with its neighbors. Gradually they developed every shade of political constitution, but in all of them the military spirit dominated. In the Roman empire the highest illustration of military power was given, which, perhaps, was according to that reasonable theory of divinely constituted evolution, which held that the world had to be dominated by some one great power, to prepare for the coming of the new religion of Christ which burst upon the world when Rome was mightiest. It took twelve centuries, it is true, to abolish the slavery, methodized and extended by the Romans; but as Christianity advanced men became free and slavery weakened. It was then that the great principle of humanity was fixed in the history of mankind—the great di-

viding line of human rights established. Later, as feudalism passed away, the military power became weakened and the civic state became stronger. But there could be no strength without military power in reserve, and no nation but ours has ever undertaken to exist without it. No nation except one situated like our own, perhaps, could have lived so long with so little attention paid to her military power.

The careful students of our institutions understand all this, and they realize that whatever antipathy existed against a standing army in the days of our forefathers, practically died out many years ago. But politicians are still alive to the situation and too often see in it opportunity for appealing to the so-called patriotism of the masses, but which as a matter of fact is commonly nothing more than an appeal to the ignorance of the masses and caste prejudice. It is not the standing army of which the smaller politician is really afraid; he is more afraid of a few thousand anarchists—a half million or more foreign exiles—the more or less scattered communities of allegedly esteemed newly-baptized citizens from abroad, all of whom make cowards of certain political leaders. It is politically more dangerous for a politician to favor an increase of any power and especially of a military power which is apt to be exercised against these new fledged citizens and aliens in our midst, than any other scheme to check their mob-like violence and rapine.

Now as a matter of fact the American people bear no ill will toward a standing, regular military establishment. Despite the political shibboleth of "Down with a standing army," despite the persistent effort of political demagogues to use this idea to fan the flames of prejudice and distrust between people and government, trades-unions and authority, labor and capital, it must be generally admitted, that no people are so enthusiastically fond of the military as the people of the United States. They now at least recall the fact, that neither the Regular nor volunteer army of the United States, has ever evinced, in any manner whatsoever, the least disloyalty to the best interests of patriotic Americans. As a matter of fact, the people of the United States have shown more readiness and enthusiasm in applauding the valorous deeds of military heroes than any other country in the world. From the battle-field of Lexington to that of Appomat-

tox Court House is written one long constant and unchanging tribute to the dead and living heroes of wars. From the days of Washington, it was from amongst those who distinguished themselves on the battle-field that was selected a President of the United States. Since the days of Abraham Lincoln, all but one of the Presidents of the United States voted for and elected as such, were military heroes, and that one exception seems but to prove the rule and to demonstrate the freaks of politics. Thus we see that Washington and his compeers in the War of Independence, Jackson after the War of 1812, Taylor and Tyler after the Mexican War, Grant, Hayes, Harrison, and now McKinley, as military heroes in our last lamentable war, all stand as proofs of the one great fact that the American people yield to loyal soldiery homage and reverence second to that of no nation in the world. For a while after the War of Secession, hardly a man in either House of Congress but what had a war history. To-day in the City of Washington there is not a conspicuous corner in the numerous parks of the capital where some proud monument has not been lifted to the heroic dead. Not only there but everywhere between the two oceans with money contributed by the national, state and municipal governments, and by private contributions, have been erected within the past generation a hundredfold more monuments than any other country can boast of. We are getting to be, if we are not already, the most monumental country in the world, and arrayed against the political demagogue and his efforts to make bad feeling and distrust between the people and the Regular Army, is the fact that most of these monuments, in this monumental country, are erected to American soldiery.

But even something more substantial than marble and bronze bears testimony to the kind feeling due the memory of the dead. We are appropriating about one hundred and forty million a year in pensions, and since 1866 have appropriated two billions of dollars for those who have been incapacitated on battle-fields and those whose sacrificed lives left helpless widows and children to the nation's care.

The most inconsistent feature of the speeches of the political agitator is the fact that while he would forever keep down the military, he is constantly endeavoring to foment international

trouble by appealing to the prejudices of the masses by every means of jingoism. The War of 1812 but for the politician might have been averted. The war of 1847 is alleged to have been begun for political reasons, and some day when the hearts of men are fully known and understood, it will be found that but for the politician the terrible fratricidal war of 1861 to 1865 might have been averted. Our present relations with Spain we pass over as too near to warrant comment.

The politicians have made every effort to restrain or prevent appropriation of necessary money or to provide for necessary reforms and changes in military tactics through professed fear. It is the same old fear that the representatives of the people doubtless had prior to the War of 1812 when the enemy marched straight to the national capital, sacked the city and burned the house of the President. It was the same old fear that held down the military and restrained and restricted military organization and armament prior to the war of 1861 when the only national armory possessed by us at the time could turn out but thirty rifles a day. In 1861 even with an extra force and enlarged facilities the Springfield Armory—then the only federal gun-shop—turned out 13,802 guns, whereas under the calls for troops in that year 700,680 men were supposed to be under arms. At that time it became necessary for us to ransack the junk-shops and out-houses of European arsenals in order to secure necessary weapons for the legions that took the field. They made it necessary then to have an army fighting with a dozen different makes of weapons and they make it necessary now in our present short war to send our Regular Army and our volunteer forces into the field with different arms and different systems of tactical organizations, which, to say the least, leads to great embarrassment. The strategy of war may never change, but the tactics of battle-fields are constantly changing and being modified with the advance of military science and improved weapons. Over a quarter of a century ago it was deemed advisable to send the greatest tactician in the American army, with a corps of able assistants, to travel around the world and ascertain the improvements in military organizations. The report of that commission which was commended to Congress by the President of the United States, and for twenty-five years since has been con-

stantly urged upon the attention of Congress by every President and Secretary of War, still awaits action. What we need in this country is a defiance of the politician by men who are intrusted with legislative power. We need careful attention to what military experts proclaim is necessary for improvement in our military system—improvements which should be made before the battle begins. We need a careful analysis of the whole question of military necessities, and a careful study of the alleged antipathy between the citizen and the soldiery in order that the purpose of pot-house politicians may be discovered and put aside.

We need now, as we have needed since the War of 1812, a military commission or a commission of well informed civic legislators to determine the best policy of a reserve military. It is not intended to advocate the establishment at this time of a "Regular" army in keeping with the apparent size of our population, but it is intended to suggest that, in a country where every man is presumed to be a possible soldier, a larger army than that we now have of 25,000 men could be wisely maintained for the dual purpose of keeping intact a necessary element of government and of maintaining a medium for practical military instruction of the masses. If, however, an army of 25,000 men was deemed necessary a generation ago, it should be doubled now.

But aside from whatever argument may be made in respect to our standing army, the purpose of this paper being in behalf of what is due the citizen soldier of the land, it is argued that one of the first duties of the Government now is to formulate a system for organization, armament and mobilization of a military reserve force. With over fourteen millions of arms-bearing men and 112,000 uniformed militia, a military commission or a legislative committee, charged with the adjudication of the question, would find a splendid basis of operation. The theory of our original militia law, which governs the present militia system in the United States, was that of decentralization of the military power. The several States of the Union were each to organize a separate militia and maintain it as separate State armies. The militia officers were to be commissioned by the States. The Federal Government had no authorized voice in militia organization, and it has been settled by decision of the

courts that the President had no constitutional right in time of peace to call out the militia for the purpose of either drill, inspection or instruction; so that when in 1892 it was proposed to mobilize a hundred thousand men at or near the Columbian Exposition to show the world the capacity of the Government to mobilize under our volunteer military system, it was found that there was no Federal authority for the scheme, which depended upon the pleasure of the State Commanders-in-chief of the various State militias.

Students of our institutions must realize that, if there was danger in the beginning in maintaining a standing Federal army, when the States were weak, there is danger now in having standing State armies when the States are strong. A combination of only a half-dozen of the largest adjacent States to-day, with their State armies under the control of State governments, so far as control and training are concerned, might, if rebellion were ever possible again in our country, become a very ugly enemy for the Federal Government to deal with. Of all the laws on the statute books, there is none which seems to have stood the test of time and been able to hold out so successfully against the demands for its repeal as that militia law clothing the States with such absolute control of the militia; the States themselves fearing doubtless to lose some of the now vested control of the matter, are willing to let emergencies arise when the President of the United States, without regard to the militia law, shall proceed to exercise his constitutional right of calling forth suitable armies of defense. Even Hamilton, according to the *Federalist*, anticipated that the militia could not be depended upon as an adequate force for war, and this fact was discovered in 1862, when for the first time in the history of the nation, the conscript system of drafting men into the service was inaugurated. But happily for our country, our pride, and our traditions, and in proof of the argument of this paper that the American citizen is ever ready to respond to the nation's demand, Abraham Lincoln, setting aside the defunct militia law, together with the amendment thereto, in 1863, by proclamation to the loyal citizens of the Union, called for 300,000 volunteers for the purpose, as he expressed it, "To reinforce our victorious armies now in the field and to bring our military

operations to a prosperous end and thus closing forever the fountains of civil sedition and war." The militia can be called into service for nine months only, but these volunteers of Abraham Lincoln bound themselves to serve throughout the remainder of the war, which was not expected to exceed three years.

To return to the natural aptitude of the American citizen for soldiery, it is recalled that within some minds there seems to be a misconception as to the adaptability of the American to military discipline. Burdened as he is with the vague notion of individual sovereignty he is apt to develop into a creature of self-conceived abnormal proportions. But it is not true that he chafes unduly under military restraint. Many who foresee difficulties in that direction before enlistment would be surprised to find how soon with practical experience they could fall naturally into line and do naturally what is required of the soldier. It took that unfortunate young General-in-chief, McClellan, some months to force some of his battalions into obedience and discipline, and the same difficulty was experienced on the opposite side, but it was not long before both armies were behaving like veterans.

It must be conceded, however, that in a war likely again to occur it would be exceedingly hazardous, not to say positively fatal, to follow the experiment of a McClellan army. That army had arrayed against it a mass of newly-made soldiers but little superior in a military sense to the men of the North, and yet even that little superiority told, for as General Schofield once asserted, nearly all the early disasters on the Federal side during the Civil War were due to the rawness and inexperience of the freshly enrolled Union soldiers. If there be another war, and with a first-class power, we can hardly hope for the good luck which has attended our late efforts in Cuba. It is not to be expected, of course, that this great reserve force of ours would be brought up to the standard either in drill or physical training of the Regular Army organizations. Only the other day it was suggested that Regular troops should be trained up to a standard of physical capacity equal to a daily march of thirty miles. But where is the logic that proclaims a necessity for physical training of the small Regular Army to such a degree of physical endurance and achievement, when we know that the

Regular Army in peace times will never be required to march thirty miles a day, and in war the physical capacity of 25,000 Regulars will be lost in the great army of a million men to be called from the counting room, the workshops and the harvest fields. They will be good able-bodied men, no doubt, but then effectiveness as soldiers must depend upon other considerations than mere feats of physical agility and drill-ground performances. I say must so depend, because it doubtless will so depend. It must be admitted that it would be a good use to make of our Regular Army to set a pace in physical training which reserve troops should imitate, but that presupposes a system and organization of reserves. As a rule, even the best of State Guards are not up to the standard of physical endurance of the Regulars, but it must also be admitted that as a rule the Regulars are not up to the standard of many of the militia organizations in show parades and prize contests. There are good reasons why these differences exist and why regular troops would not compete with prize contest peace soldiers as the Germans have already discovered. The new German theory is that too much time is wasted in perfecting men in the rigidity of precision of some features of the manual of arms, and Prince Hohenlohe, from close observation, found that by less precision in a single effort to make the German "Right Shoulder" precise, several weeks time was economized from barrack drill hours, for field exercises. Another German theory is based upon what everybody ought to know, namely, that the average man from the lower and middle, if not from all walks of life, uses only one set of muscles. That is, the artisan uses only those muscles which his daily work requires. The Germans, therefore, teach their recruits first of all to exercise and develop all the muscles, and only then assume that they can do their part on the march.

But referring again to the volunteer in our Civil War it must be remarked that if they failed to exhibit the outward signs of the discipline that really governed them, there was in them, what General Sherman happily styled, the true soul of an army, that element upon which, aside from all else, a leader must chiefly rely in battle. The renowned General De Chenal says of the Federal army in the Secession War "At the core, and

in all that is essential, its discipline is as good, if not better, than that of the European armies, but it has not the exterior marks, and the observer who merely passes through the American army may thus be deceived."

An observer, likewise, who merely passes through the American people may also be deceived. Even some of our political leaders are deceived, but they deceive themselves most when they think they are deceiving the American people. They essay to pander to popular prejudice when they preach against a standing army, but people have already become convinced that a military organization, like a judicial organization, is necessary to law and order. The people not only do not share the pretended or professed timidity of the politician, but the time is not far distant when that class of reflective voters, always dominant at the polls, will compel the politician, whether he be ward agitator or national leader, to heed the demands of good and safe government by paying due attention to our long neglected military establishment.

The people have never before appeared so anxious for military enlightenment and training as now, and in a country where the law theoretically holds every male person between the ages of 18 and 45 liable to military duty, the people have a right to some of that military knowledge which is now spreading over the entire world. The people want to be educated in military science and tactics. Every year colleges, schools and universities are petitioning Congress for military instructors, and notwithstanding that only a few years ago the number for that purpose was doubled, not half of the 250 colleges who desire military instruction can have an officer detailed. At every State military encampment, army officers are asked for, and to show the eagerness of the citizen soldiery to learn, and their respect for the Regular Army officer, be his rank what it may, the fact may be mentioned that in encampments during the past year, subaltern officers of the Regular Army have acted as inspectors of camps of major-generals and brigade commanders. Many of the Governors have Regular Army officers detailed to assist State officials, and even the common schools are clamoring for their rights to have military instructors detailed to supervise the drills of common schools.

All these signs have an unmistakable meaning. The people desire that their youths be drilled. Mere drill, it is true, does not make a good soldier, but drill will make of a natural soldier a better soldier and more subject to discipline in the emergency of war. And the drilling of such men should not be delayed until they reach the battle-fields. It is a mistaken theory of political economy to dwarf the military in time of peace because it is a cheaper policy, and in time of war to pay the penalty by the sacrifice of human lives and the destruction of property which result from hasty preparation. The souls of a half million dead patriots, many of them needlessly sacrificed in our late war, would cry out against a continuance of the blind indifference to our military welfare which demonstrated its vicious effects on the early battle-fields of the Rebellion.

A well-known military critic aptly declares, that "The soldier who, because in some distant age some ancient conqueror may have gained his success by mother-wit alone, dares to risk the lives of men who are entrusted to his charge without making a study for his own education, of the experience of the past, is a criminal more dangerous to his country than any ordinary murderer."

In 1812 not only the lives of men but the dignity of the nation and the archives of government were jeopardized and plundered because of the disregard of the experiences of the past and the necessities of the times. Owing to our imperfect military system two Secretaries of War were compelled to lay down their portfolios while our second war was progressing, and one of them in justification of his course, declared that but for the lack of military knowledge the militia at Bladensburg would not have abandoned to the enemy the unobstructed road to the national capital.

In a paper on military instruction, referring to the proposition to reduce the expenses of the military establishment, John C. Calhoun, then Secretary of War, said in 1820: "Economy is certainly a very high political virtue, intimately connected with the power and public wishes of a community. In military operations, which under the best management, are expensive, it is of the utmost importance; but by no property of language can that arrangement be called economical, which in order that our

military establishment in peace should be rather less expensive, would, regardless of the purposes for which it ought to be maintained, render it unfit to meet the dangers incident to a state of war."

It was also one of the terse assertions of Mr. Calhoun that "No truth is better supported by history than that the circumstances being nearly equal, victory will be on the side of those who have the best instructed officers." The great Napoleon, who produced the military axiom that "Heaven is on the side of the strongest battalions," afterwards modified that high sounding dogma by declaring that competency of officers and especially of subalterns gave the most valued strength to the backbone of an army.

Following the thought of these two great men, brings us again to the important question, how can we best provide a system for officering the million or two of civic soldiers that must be ready for the field in our next war. Admitting that from among the fourteen million of arms-bearing citizens we may be able to gather an army of able-bodied men equal to the hardships of field service, capable of learning within a brief period enough of the rudiments of military drill to enable them to move in column and form in line of battle; admitting that they will take naturally to the rifle and be able to handle it with that calmness, coolness and precision which modern fire discipline will require on battle-fields; admitting that the great mass of private soldiers and petty non-commissioned officers may be quickly amassed in an emergency, it is nevertheless a fact that the most serious problem of our next war will be the securing of competent and trained men to act as officers and leaders of this great army we are counting upon in reserve. Bear in mind that aside from the private military schools where a limited degree of military training is conducted, the only Federal military establishment in this country graduates on an average only about fifty young officers annually.

Assuming that the limit of age for the officers of the volunteer forces in time of war will correspond to the limits prescribed for the soldier, viz. : 18 to 45 years of age, it must be borne in mind that if a war should occur again to-morrow only 1200 men who graduated in the past twenty-four years at the age of

twenty-one would be eligible in the forty-five years limit. But are not all of the officers that have graduated up to date needed for the present small military establishment? Our little army of 25,000 men now contains upwards of 2500 officers. To officer an army of one million men would require 35,000 regimental officers alone to say nothing of the large number required for the staffs of armies, corps, divisions and brigades. From whence could that number of men be drawn? Doubtless there are regiments in the National Guard of the States and companies in the State militia that could supply a large number of officers, but I respectfully submit that the time has come when military statesmanship should give more thought to the leadership of men than has been done heretofore. New York State organizations should not be expected or required to furnish officers for Iowa, Kansas, or Idaho. Each State under a generally well fostered rule should be assisted to maintain State pride by having State troops officered by competent State officers. There has been a great revolution in war methods within the past generation and vast improvements have been made in war implements. Military leadership is no longer within the reach of every civic layman. Even the born soldier so-called must know something more than to draw the sword; and the usefulness of the leader in battle will depend more upon knowledge of soldiery and military training than upon individual acts of gallantry or personal example of bravery. The officer must be able to teach, direct, train and instruct the raw material which he will have in the massive ranks of the volunteers. And right here might be called to mind that recent suggestion of a method to attract into the ranks of the Regular Army in times of peace a class of men who could be discharged after services as non-commissioned officers with a nominal rank of second lieutenant, so as to constitute a class of eligibles for duty with State troops. Whatever be the means the end should never be lost sight of, that is, the necessity for training men among this vast concourse of fourteen millions of arms-bearing citizens to officer the battalions in time of war. The clever German critic Prince Kraft, writing of the importance of the inferior officers, that is the captains and the lieutenants of companies, says: "They are in fact the soul of the whole of the instruction and

execution of infantry duty. This is certainly the case in other arms also, but the very circumstance that while in the cavalry the strength of a body of troops is counted by horses, and in the artillery by guns, in the infantry alone it is reckoned by men, shows at once that in the latter arm the human physical element is the only important one, and that the influence of their leader on individual men has greater prominence in the infantry." He goes further and asserts that he has no comrade and will recall incidents on battle-fields to show that the company officer is the soul of the infantry. In Germany, like in every other country, including the United States, the infantry as we all know constitutes the bulk of armies. General Von Ruchel said in the last century that "The spirit of the Prussian army is in its officers," and as Prince Hohenlohe asks, is this not all the more important now when the theory and tactical requirements of battle action is to divide up larger commands into small units, leaving to company, platoon or squad to follow some inferior officer? No soldier is braver than the American, and yet none depends more upon his officers, and over and above all upon his immediate leader.

It has been observed that it is a poor policy, if not a fatal one, to postpone the organization, drill and discipline of the reserve until they are needed in war. Drill and discipline presupposes organization and are prerequisites to battle-field success. In the War of Secession, as Major-General Merritt asserts, it took one year to prepare our volunteers for combat, and that policy due chiefly to the lack of experienced officers, bad enough then, would be more fatal in any future war. The periods of our wars are lessening as weapons are improved and their tactical uses perfected. War it must be remembered is "a method of compulsion used by one nation against another." It has been defined to be a duel between nations wherein might is superior to right. The future wars must be of more gigantic magnitude than ever before. The nation that is but half ready at the declaration for war is more than half whipped before the first battle. Indeed, as Major-General Merritt says in his criticism, "No war between war-making powers of Europe in the last thirty years has occupied the time that would take to prepare the best reserves that we have for the field."

Our people, it is conceded even by politicians, are born soldiers of the world. And assuming that they are second to no other people in military enthusiasm and national patriotism, the admonition must be recalled that "Enthusiasm and patriotism alone will not gain battles, but may add to the gravity of disaster."

What this country needs is that sort of military statesmanship which will recognize the inevitable in time of war, be guided by the experiences of war, and look with open eyes to the certain effects of given causes and conditions.

In conclusion it is submitted that the purpose of this paper has been chiefly to call attention to the error of a commonly accepted conclusion that because for nearly one hundred years the sea-coasts of the United States were left almost defenseless and the navy neglected, because despite every common-sense argument the genius of national statesmanship has been exercised possibly in every other direction save the military, because of the failure of the people's chosen agents to perform their fullest duty regardless of petty policy, because of all this neglect even in the face of the warnings of our political scientists and military advisers, because indeed we are not listed among the warlike nations of the world, our people are to be regarded as non-military. Forsooth, the fullest military capacity of the people of this American Republic has never yet been demonstrated. Proud as have been past achievements, no man can foretell the future of a country whose vast resources—growing so steadily into wealth that rivals that of any and all other peoples—are meanwhile protected by a suitable and sensible military system of defense. It is not intended in this paper to prescribe a remedy, but only to point out the vital defect. Any one of the remedies proposed from time to time to Congress by the proper military advisers of the nation, would do well enough to adopt in the beginning at least. But for the sake of common sense, for the sake of our people, for the sake of our national pride, for the sake possibly of our liberty, let some military statesman arise, let some statesmanship prove powerful enough to champion and expound the policy enunciated by Washington, our first great general, our first President, when he advised us, "In time of peace, prepare for war."

THE ROLE OF THE NAVY IN SEA-COAST DEFENSE.*

BY FIRST-LIEUT. H. L. HAWTHORNE, 6TH U. S. ARTILLERY.

THE actual part which the navy will play in the defense of our coasts must be left to the future development of our military power. Should this development take the direction of strong naval resources, supplemented by protected internal and connecting deep waterways, the land defenses must needs be reduced to a minor rôle. Should, however, the land forces be amply provided for and adequate harbor batteries be erected, the naval power will not preponderate, but be kept strong enough for active operations on the high seas. We have begun to modernize both these military branches, but so far neither has attained such a strength as to indicate what the defensive policy of our people shall be in regard to the coast line. The question, if it exist at all, occupies the attention of military men only; and among them, very decided views have been expressed on the nature and government of our land and water sea-coast defenses. Certain naval advocates strongly urge the placing of the seaboard exclusively in naval hands, and they cite in support of their position the well-known example of certain highly developed military systems of Europe. On the side of the army, there appear to be no extremists, nearly all favoring a combined army and navy defense for all large and important harbors.

In questions of governmental policy, the people of the United States are closely bound to tradition. Evidences of this are nowhere more distinct than in our military establishments. If there were no other reason than this, we of the land arm may rest content that no violent foreign innovations will be permitted to cast aside our own natural development and to un-Americanize

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a system which this people has inherited, accepted and battle-tried.

When all the reasons for the naval control of the coast defenses have been stated, the one striking fact becomes most evident, that every argument in favor of this change is trivial when compared with the urgent one of foreign example. It is shown that Germany, Norway and Sweden have entrusted their coast defenses wholly to the navy; that France and Austria have given the navy a preponderating control; that Italy is closely following their lead; and that finally Russia, though no one can ever be positive of anything about that power, has given a large place to her naval authorities in directing the defenses of the coast. It is a matter for intense regret to those urging the propriety of naval control that the country having the deepest and most numerous harbors, the most exposed coast line and a strategic position largely demanding a defensive attitude has not only not adopted this German system, but flatly scorned it when proposed. When England's geographical and topographical conditions are compared with those of the other European states, one is strongly reminded of a similarity to those existing here. Our coast line, too, is long, with many deep or navigable and important harbors. We, like England, have no frontier lines of powerful forts requiring thousands of artillery soldiers; there is no compulsory army organization draining the country of men for the land forces and thus leaving necessarily the work of coast defense to the navy. No European country but England has centuries of naval successes on the high seas to strengthen the influence of proud tradition and to wed its navy to the element to which it wholly belongs. So we here find these conditions almost repeated on this continent, and with a story of naval prowess not so long but just as glorious.

In a country like ours where the development of military strength will never be very high nor lasting, we can be sure that neither the army nor navy will ever attain in times of peace dimensions very much greater than they have at present. It is therefore of the greatest moment to the sea-coast artillery to prevent absorption by the naval arm. There can be no doubt that were the harbor defenses the sole care of the

navy, the land forts would be reduced to their lowest terms and the mobile defense enlarged and made the greatly preponderating force. There can be no middle ground. With every strategic maxim demanding a coast defense at sea and every professional impulse urging them to use the weapons and to seek the element with which they are most familiar, it cannot be doubted that our naval authorities would foster a naval development to the detriment and diminution of the land defenses.

Before we shall be permitted to do violence to the system of coast defense with which our people have lived since the beginning we will be asked if there be a strong need for some change to which our military experts can unanimously agree ; and next, what will it cost. Granting that the sea-coast artillery corps of the army were content to accept this military revolution, what answer must be given to the second question. As it must be plain that under naval control the preponderating strength in our coast-defense scheme will be given to the navy, therefore the principal source of expense will be for naval material. Experience with Congress has taught us that few military plans in times of peace receive adequate financial backing solely because of their military virtues. The footing of the bills must always be the centre of interest to our legislators, and a plan however commendable, if costly, will be laid aside for one inferior, perhaps, but cheaper. So in the present issue we should present our case in dollars and cents with an expectation born of much experience that the lowest bidder will get the contract.

This country has passed through various phases of fort building from the shabby earthworks of the Revolution, through the unprofessional conceptions of the period of the War of 1812, the elaborate and expensive creations of ante-Rebellion days, to the present exhausted enthusiasm for modern forts, begun five years ago. It would be needless to inquire into the expensive constructions before the War of the Rebellion because of the vast difference between the cost of war material at that time and the present. It cannot be said that the present occupied coast defenses have been a source of grave expense to the country. From 1865 to 1890, \$10,974,000 have been appropriated for the purchase of sites and the construction of fortifications. This

can hardly be regarded as a drain on our resources, considering the object for which this money was spent. An awakened desire to make the coast secure against modern attack came in 1890 by the appropriation by Congress of \$1,221,000 for the beginning of adequate fortifications in our principal harbors. Under this encouragement, the construction of some modern works was begun; and although we are at the present day as helpless as ever, still the work so far executed gives us a just idea of the real cost of coast fortifications and enables us to make a close estimate of the amount of money necessary to put our important harbors in a condition to defy attack, so far as concerns the land batteries only.

In order to make a just comparison of cost between a land and naval defense, it must first be decided just what amount of fortifying a harbor would need and compare this with the amount of floating defense a purely naval defense would require. Then to get the cost of each, the estimates for land work may be found from sources just stated; whereas in the opposing case of floating defense we must have fully decided the character of vessels which naval experts would designate as best suited to this policy. Mines, torpedoes and torpedo boats, being common to both schemes, may be eliminated from our calculation. The following shows the projected harbor defenses of New York and their probable cost:

Nature of Defense.	Cost of Each.	Total Cost.
9 turrets (2 guns each)	\$1,000,000	\$9,000,000
21 lifts (41 guns)	141,000	5,801,500
20 disappearing (10" guns)	35,000	700,000
15 " (8" guns)	30,000	450,000
11 groups mortars (16 each)	150,000	1,650,000
5 mining casemates	18,100	90,750
Total		\$17,692,250

NOTE.—Armament for above, \$11,854,622.

We will now consider the floating force needed for the defense of New York Harbor supposing it undefended by land works. As the first object of a defending force must be to prevent bombardment, the outer zones of resistance would be found outside Coney Island and Sandy Hook lines, at the southern

entrance ; and the Fisher's Island-Montauk line, at the eastern entrance. These large water areas, the one eight, and the other fifteen miles in breadth, would require a strong battle line of heavy, armored coast-defense vessels ; the least force, with due allowance for manœuvring, would be four for each entrance. These vessels should have unusually heavy armor, draft less than sea-going battle-ships to give them a large water area for manœuvring, and armed with the heaviest guns afloat, with strong secondary batteries. For these special qualifications there must be sacrificed some speed and coal capacity, neither qualities eminently needed in a harbor vessel. The next class of harbor-defense vessel should be selected with a view to rapid manœuvring on both the inner and outer lines of defense. Such a vessel should be shorter, less in draught and with less side armor than the first class ; of low freeboard, heavily armored turrets and especially strong fore and aft fire, a fairly strong secondary battery, and fitted for ramming. For fighting in the Upper Bay and Long Island Sound, forming, so to speak, a second line of battle to the heavier boats, to act on the flanks and to meet protected cruisers, there should be of this class for the defense of New York, not less than five at each entrance. A third type should be a very light draft, handy, unarmored, speedy vessel, designed for service in shallow bays and narrow channels, armed with a single bow gun and rapid-fire guns, arranged for bow fighting and well supplied with torpedoes. These boats, intended for work against an enemy's large torpedo vessels, would also be needed for the protection of mine fields, look-out stations and search-lights. About eight of these would be needed for New York Harbor. We are now prepared to find about the cost of such a naval defense of the waters leading to New York.

Class of Vessel.	Cost of Each.	Total Cost.
8 heavy-armored harbor defense (8000 tons)	\$3,500,000	\$28,000,000
10 armored, low freeboard harbor vessels.	2,800,000	28,000,000
8 gunboats (700 tons)	350,000	2,800,000
Total		\$58,800,000

It is thus seen that a purely naval defense of New York, equal in probable efficiency to permanent land works, would cost at the outset more than three times as much as the fortifications, assuming the armament and mounts of equal value and mines and torpedoes common to both systems.

There is still a very important item to consider, and that the cost of keeping this war material at all times in its original state of efficiency. In the case of land works, deterioration is caused by wear in every-day use, damage done because of exposure to the weather, accidents and the weakening effects of age. Where reasonable money allowances are provided, fortifications can be kept to their full defensive powers at all times. In the estimates for 1895-96, the Chief of Engineers asks for \$85,000 for keeping in repair the fortifications of the whole country, not especially provided for; that is to say, not building. This he considers a fair allowance. Suppose we allow this amount for the harbor of New York alone. We thus find that about one-half of one per cent. of the original cost of the fortifications, would keep our defenses in the very best state of efficiency.

Modern ships, with their elaborate systems of ventilation, drainage, and mechanical auxiliaries of all kinds, require the utmost care at all times and neglect is followed by most serious and far-reaching deterioration. In spite of the most careful supervision and repair, a general decay or loss of efficiency goes on, increasing with the aging of the ship, until nothing but entire reproduction of some costly part, requiring immediate appropriation, will prevent the vessel being laid up in ordinary. It has been found in our navy that where the repair appropriation has been limited to 3 per cent. of the original cost of the vessels the Department had to economize to the danger point. In the British service this sum varies from 4 to 9 per cent., according to the kind of vessel, the lower figure applying to the heaviest armored battle-ship.

In the case presented here, the very lowest estimate for repairs would be over two and a quarter millions annually. At the end of ten years our naval defense of this harbor will have cost us more than four times that of land works of equal efficiency, repairs included.

Of course there is no unit of measure by which forces afloat

and ashore may be strictly compared. For the purposes of this discussion the land defenses prescribed for this harbor by the Board of Fortification were accepted. In a naval defense it is difficult to tell just what might be regarded as sufficient by naval tacticians. The selection of the number and kind of vessels for this service enumerated above is based on the recommendations of the Fortification Board for fortified harbors and the practice abroad by the English and French. For example, in 1889, in the distribution of forces for the defense of the English coast against an attack by a fleet composed of 18 battle-ships and cruisers, and 11 torpedo vessels of all kinds, there was organized a sea-going fleet of 24 battle-ships and cruisers, and 12 torpedo boats. This occupied, at the beginning, a strategic, fortified harbor, while the undefended harbors were patrolled by squadrons of coast-defense vessels. One of these consisted of 4 armored coast-defense vessels, 3 armored and protected cruisers and 4 torpedo boats. Forces such as this failed to prevent the hostile fleet making descents upon the coast and bombarding the towns.

In deciding on a naval force for the defense of this harbor, the widely separated entrances were regarded as two harbors, each requiring an active force at its outer line. This must of necessity be the case where there are no land works to delay the enemy, thus allowing fleet concentration and where the occupation of one entrance would render the other untenable.

A third scheme, intermediate, so to speak, between the naval control and the combined army and navy control of harbor and coast defense is one which has taken form under a title rather than in a ripened and elaborate plan. This proposition is to create a fighting body for fortress and naval service whose officers and men are not to be included in either army or navy, but to be organized into what is called a Coast Defense Corps. The promoter of this plan scarcely goes beyond the vaguest outlines in presenting its advantages over the more definite rival organizations, and details are left to any hazy individual conceptions which this suggestive title might arouse. Without seeking to retire to the luxury of timid conservatism, the opinion is offered that this proposition is too foreign to our long accepted principles in sea-coast defense; too un-American in its tendency

towards military specialization ; too advanced, if you will, to be acceptable to Congress or to the services. In addition to the general question of the actual need for such a corps in the light of our past history, there arises a crowd of difficulties in promotion, pay, assignments to command and class of service, origin of commissions for duty on ships and on shore, precedence, staff organizations, origin and means of supply, war development and resulting promotions and all that follows, and so on, until the intricacy and readjustments to present conditions would too profoundly disturb our living military establishments. It is not denied that such a plan is possible, only it seems to lack every element of feasibility both in Congressional support and in any hope of practical solution.

At this late day it is needless to argue against a purely naval defense of our coasts. The agitation which led to this proposition grew out of a mistaken notion of what was taking place abroad, and in the first flush of the discovery, many wrong-headed but ardent supporters of the navy, for a time sincerely believed in the possibility of a sole dependancy on sea power for the protection of our coast. One public official, high in office, triumphantly and publicly announced the supposed valuelessness of land forts and the supreme reliance which the country should place in fleets for its protection against a maritime foe. It presently became apparent that defense by fortifications was far from being abandoned abroad, but that, on the contrary, new and enormously powerful works were being erected continuously ; and furthermore, naval experts had discovered that not only should ships avoid hostile contact with land works, but that by their very design they were not intended for such use. Abandoning this attitude, lesser naval lights directed the general enthusiasm aroused by the appearance of the White Squadron, to the transfer of the coast batteries to naval control and management. As already related, the example abroad was the principal argument ; and before the flurry of this revolutionary proposition had died away, a portion of the press had been converted to this view and strange to relate, so had some artillerists of some reputation.

Without the guidance of actual operations, there must be uncertainty as to the true combination of forces and their or-

ganization for perfect coast defense. Many things of value may be learned from naval manœuvres, and the late unequal contest in the Orient is not without its strategic lessons. If the history of actual naval operations needed verification in our day, it has most fully received it in the naval peace manœuvres conducted by the several maritime powers of Europe during the past five years. When these campaigns were directed with intelligence and vigor, when there were no prearranged moves to deprive fleet and squadron commanders of independence of action, and when care was taken to approach war conditions as closely as possible in every particular, then the results shown should be regarded with due seriousness and given fair weight in the choice of a coast-defense policy.

From the story of these manœuvres which were designed to illustrate actual situations in the defense of coast lines, the reader is strongly impressed with the following logical deductions: (1) to successfully defend even a moderate length of unfortified coast line, a defending fleet must be strong enough to separate into two or more bodies, each sufficiently large to break a blockade by the enemy.

2. Should the enemy's fleet be stronger than that of the defense, the latter dare not remain in port for fear of blockade.

3. It is impossible for one fleet to mask another without being in actual touch with it; otherwise the attacker is lost and the coast open to surprise.

4. A coast whose harbors are defended by defense-vessels only is helpless against concentrated attack.

5. For a successful defense, a defending fleet must be active in the offing, keep touch with its adversary, and have fortified harbors in which to refit, recoal, and obtain protection.

6. Each fortified harbor is a strategic base for an active, defending fleet, thus enlarging its theatre of manœuvres and giving it more opportunities for detached operations; hence it follows that the defense gains the full value of its commerce destroyers.

7. And finally, a power determined on a purely naval defense must have in each port of commercial importance a strong fleet of harbor-defense vessels, including battle-ships, protected cruisers, floating batteries, and torpedo vessels (as it cannot be

known where the enemy's attack will develop), and in addition, one or more powerful cruising fleets, fitted to meet the fighting ships of any enemy and to prey on its commerce.

A summary of the English and French naval manœuvres may be given as illustrations of some of these deductions.

English naval manœuvres of 1889. General idea.—A strong maritime force occupies two adjacent naval fortified ports. It is on the offensive. Its opponent has a stronger fleet, concentrated in ports most suitable for masking the enemy's fleet with small squadrons for patrolling and protecting its own coast against attacks of cruisers. The harbor squadrons consisted of armored coast-defense vessels, cruisers and torpedo boats. The result to which attention is especially called is that the coast-defense flotilla offered no impediment to the enterprises of the enemy.

French manœuvres of 1889. Problem: A strong fleet to defend less than 200 miles of coast. Enemy's fleet was weaker but slightly swifter. Ports undefended by land works. The defense had 13 battle-ships and cruisers and 22 torpedo boats. The attack had seven battle-ships and cruisers and 3 torpedo, deep-sea vessels. In six days the attacking fleet had succeeded in bombarding or capturing nearly every town on the defended coast, including the large naval ports, and destroying in several places a strategic railway. This success was accomplished by feints to draw away the defending fleet while the actual attacks were made on ports defended only by torpedo boats or a few harbor-defense vessels. In one case the harbor-defense vessels were induced to leave the harbor and then were easily driven away by cruisers.

Italian manœuvres of 1893. An attacking fleet slightly the stronger succeeded in deceiving its adversary, defending 400 miles of coast, with harbors defended by boats only. Landings were made, stores and railways destroyed.

A SCHEME FOR THE DEFENSE OF OUR COASTS.

If it be generally conceded that the determined policy of coast defense will place this duty in the hands of both army and navy, there should be a distinct understanding as to the limits of the part each is to take, these by prearrangement being made to depend on the strength and distribution of each arm.

To begin with, there is always a common objective—the ship or ships endeavoring to obtain hostile control of the coast and harbors. Before any problem, strategic or tactical, can hope for fair solution when two such distinctive arms as ships of war and fortifications are combined, there must be a full and sincere study of the situation in a united council of the naval and military heads concerned. To that end the services should be brought much nearer together than they are at present, in the discussion and study of coast-defense problems, not only to provide more intelligently for any future combination, but to become mutually informed on the capabilities of each branch of the defense, that each may know the limits of power and the conditions of maximum efficiency of the other. To this end there should be a special training in coast defense for line officers of the navy and artillery officers, to be given under the auspices of both services and under the conduct of the best naval and military instructors. The naval War College, broadened and less exclusive, would offer a ground plan for such a project. To be of real value, such a college should be under the immediate supervision of the War and Navy departments; and the aim should be, not only to instruct the officers of the two services in the best means of united action, but actually to prepare plans for defense against any possible attack from the sea, arranging definite combinations and drawing up all necessary orders to cause instant execution. As the material of both branches continued to accumulate and strengthen, these plans could be modified and rearranged to conform to such increase.

Thus, not only would our country be prepared at all times for naval attack, so far as our means of defense would allow, but both services would be prepared to perform their parts with greater mutual confidence and less delay and confusion. As a minor means to this end, there should be a common code of signals, an easy means of transmission of information concerning the enemy's vessels from the ships to the shore and some common method of showing location of real and dummy mine fields. The individual practice of the two services should have in view their duties in combined manœuvres, which should be held at least once a year.

With a prospect of mutual aid comes the regret that the ordnance construction corps of the two services have seen fit to separate so widely on calibres, ammunition and mechanism, making interchange or a common source of artillery supply impossible.

The defense of our coasts would seem to require :

1. A fleet for strategic operations and blockade.
2. Squadrons for harbor and zone defense.
3. Forts, batteries, torpedoes directed from land, mine fields.

This paper calls special attention to 1 and 2.

I. THE FLEET.

Modern practice seems to make the sea-going fleet a strategic factor in its relation to the defense of its own coast ; and its exact employment depends on the comparative size of itself and the opposing fleet, the length of coast to be defended, the defensive condition of its harbors, the distance of the enemy's fleet from its base of supplies and the possession of coaling stations away from its own coast. Other influencing elements enter into this, but those named are sufficient to give a general estimate of the value of a sea-going fleet in coast defense.

Should our enemy have naval strength sufficient to induce it to take the offensive, then our plans must decide :

1st. Whether our fleet is strong enough to manœuvre against it ;

2d. If strong enough, how far from its own base should it get touch with the enemy, this distance depending on defended coaling stations in the theatre of operations ;

3d. The defensive condition of our harbors and coast zones.

These considerations lead us to the following strategic values for our sea-going fleet in the defense of our coasts :

The fleet will take the initiative-offensive :

1. If our harbors are fully defended ;
2. If the enemy's fleet be not overpowering ;
3. If the enemy's ports be not too distant, or, if distant, if we have defended coaling stations near the line of advance.

These conditions mutually counteract or assist each other whereby the weakness of one may lessen or be offset by the

strength of the other. In the latter case, for example, the fleet could still retain the offensive if the enemy have but little naval strength, such as in the case of Brazil, even should our harbor protection be slight.

The fleet would assume the defensive-offensive:

1. When the enemy's fleet is overwhelming—all other qualities being fairly equal.
2. When the fleets are fairly matched, but the enemy distant and we have no coaling stations except at home.
3. When our ports are poorly defended and the enemy active.

The naval captains of an earlier age showed that a coast was never so well defended by them as when they cruised off their enemy's ports or kept in touch with his fleet. Possibly these methods have been modified to some extent by the leveling effect on national morale of modern armor and ordnance and the increased dependence of fleets on bases of supply. All history seems to teach that a fleet strictly on the defensive must sooner or later meet with disaster.

2. THE SQUADRONS.

The composition of harbor defense squadrons depends so entirely on local conditions that no general, fixed value can be given them. Should the port be near deep water, and hence subject to bombardment, a certain class of vessels is needed to form an outer line where the enemy's battle-ships or armored cruisers are to be met. Again, where the character of the shore line forbids extensive fixed defenses, as at the lower Mississippi, the defense squadrons should be proportionately increased, and organized to meet the sea-going fleet of the enemy. The organization of a harbor squadron would approach that of a sea-going fleet, also, when the channel was wide and too great for the effective use of shore guns, as Broad Channel, at Boston.

It therefore follows that where strong works can be so placed as to fully protect a port from bombardment, and the width of channels are such that the fire from the land can be made overwhelming, the harbor fleet can be minimized and the heavy battle-ships probably eliminated. Having determined by these

limiting conditions the strength of any harbor fleet, it now remains to consider the probable use to be made of this force against an attack by sea.

The designs and movements of the enemy must largely govern the disposition of our harbor vessels, although they should not be so restricted as to deprive them of the power of the offensive should opportunities offer.

The part the mobile defense should play may be described briefly in an enumeration of the phases which an attack on a harbor might take.

1. *Blockade.*—Hostile dispositions made for the purpose of blockade, will naturally throw the burden of the offensive efforts of the defense on the harbor fleet. To begin with, the approach of the enemy's fleet must be vigorously disputed, with a hope of delaying the complete establishment of the blockade and of compelling the enemy to reinforce his fleet. This may result in a weakening at some important point elsewhere, thus tending to make the blockade unacceptable to neutral powers. A large blockading fleet will have many vulnerable points, and, with the defenders' more intimate knowledge of the coast, harbor exits and mine fields, their interior lines and safety and comfort in stormy weather, the harbor squadron, actively and fearlessly handled, could embarrass or at least distress a fleet many times stronger than itself. Constant attacks along the whole width of the harbor will force the blockaders to occupy a broad front in order to close every point of egress, and the weakness that this might entail should be turned to good account. The scouting boats of the enemy must be met at all times; so also attempts on torpedo and signal stations, search-lights, and, in fact, all the defensive preparations not under the direct protection of the land batteries. The vessels most adapted to such enterprises would be torpedo vessels of about 600 to 700 tons and torpedo boats of 100 tons or less. They should be swift, noiseless, manageable, and with low freeboard. Their value under these conditions may be illustrated by reference to the performances of the *Cushing* at Newport. Leaving the land on a dark night, in the full glare of a powerful search-light and continuing in it, she became invisible at a thousand yards, although on the *Cushing* it was light

enough to read by. Her movements were inaudible at 800 yards, which is the extreme but working range of the most effective torpedo.

2. *Bombardment*.—When a bombardment is deliberately entered on against a defended port, it is because a direct attack is thought to be too dangerous, or, for topographical reasons, unnecessary. No general attack being feared, the whole floating defense should be developed, even to advancing heavy defense vessels to within fighting range. They should especially guard against the occupancy of any dead space which the shore might offer the enemy's ships and not sufficiently provided for in the tactical arrangements on land.

3. *The Run Past*.—Active and determined attacks on the mine fields and obstructions in a channel of fair width will be almost certain indications of an attempt to run past the batteries. The physical conditions of most harbors will require the column formation in such a manœuvre; so the floating defense should make dispositions especially adapted to meet such arrangement. This formation is peculiarly weak in bow fighting, as the main power of the attack must be directed against the land works on the flanks; therefore it would seem that, to envelop the leading hostile ships with the whole power of the harbor vessels and to crush or delay the column, ought to prove most effective. This would be especially opportune as the column is just emerging from the inner entrance of some intricate or narrow channel, or just after passing through the mine fields and before it has time to form up in a stronger order.

One of the principal dangers against which the harbor fleet must guard, is permitting itself to get mixed up with the attackers and thus paralyze the mine and gun defenses. This is even greater in the case of an attempt to run past at night or in mists where it might be impossible to distinguish friend from foe. So serious a situation is this that some authorities insist on the heavy harbor-defense ships remaining far inside the area of the land defense, and taking the offensive only when their immediate waters are invaded. This would appear to be a waste of good fighting material; and it would seem that to fix hard and fast boundaries for the operations of the several means of defense is of doubtful tactical merit. The greatest

activity on the water must fall to the guard and torpedo boats. It is their duty to closely watch the enemy, report his movements, feints and tricks of concealment, prevent, if possible, his attacks on the mine fields and the removal of obstructions during fogs and at night, and to defeat all attempts of his torpedo boats to steal into the harbor to attack the heavy vessels. By a thorough understanding between the land and water defense forces as to points of resistance, when objectives should be transferred from the land to the water defenses, and the direction of the retreat or withdrawal of the defense vessels, if necessary, the heavy floating batteries could be used with effect at the outer harbor in conjunction with the forts, as easily as can any two groups of isolated land works.

4. *The Naval Attack.*—The operations of the harbor fleet cannot differ much in a regular attack by a hostile fleet from those used against an attempt to run past, as just described. The preparations by the enemy will be more prolonged and irritating, and the attack made in broad daylight on the ebb tide. The formation will be compact, the heads of columns, armored cruisers with powerful bow fire. Torpedo boats will be organized for special attacks on the harbor ships, so as to draw their attention and throw them into confusion. The natural counter to these dispositions would be the fullest development of broadside, raking fire from the harbor ships, a concentration of torpedo vessels against those of the enemy, and, when there can be no interference with the fire from the land, the ram should be used. In such engagements, the light draft, handy helms and quick movements of properly designed harbor boats would give them many advantages over those of the enemy; and these, added to a more intimate acquaintance with the harbor, should encourage a naval commander to attack fearlessly forces many times greater than his own.

5. *Combined Naval and Land Attack and Masking Batteries for a Land Attack.*—A land attack, delivered by troops conveyed in ships, will scarcely be attempted in the presence of a strong harbor fleet. The harbor forts, in such operations, must remain inert, any attack on them being purely in the nature of a bombardment. The defense vessels, however, should be doubly active and should assume the offensive against almost

any odds. The particular opportunity for the home fleet is during the debarkation, a moment when the enemy is least prepared to resist effectually. The harbor vessels will probably meet, at the beginning, a portion of the hostile fleet especially told off to prevent their interference; and here the situation calls forth the highest naval tactical knowledge, manœuvre training and morale. Independence of action must be given the commander of the home fleet; and even the advisableness of the attack should be the result of his own judgment.

This paper has tried to show the limits of action of naval forces in coast defense, accepting as a basis the generally approved plan that the manœuvres of the sea fleet must be wholly strategic, while those of the harbor squadron largely tactical, with direct and permanent relation to the land works of the port to which it may be assigned. The view presented is a military one, with no attempt to inquire into the proper distribution and combination of naval material, nor to learn the special influence on nautical values of the sailor's craft. In future schemes of defense, the district military commander will not plead ignorance of the uses and possibilities of his floating arm as an excuse for failure or lack of enterprise. Such a commander must know and will know, if land and water combinations ever get beyond the theoretical stage with us, the most judicious and scientific uses for every weapon under his control. This means organization of the most far-reaching and thoughtful kind, not the slipshod, happy-go-unlucky state of defensive means and measures under which we have grown old, rusty, and conservative.

THE FRENCH ACTIVE ARMY.

BY CAPTAIN E. D. PARKER, LATE 1ST MANCHESTER REGIMENT (ENGLAND).

THE French active army consists of 163 regiments of line infantry, 30 battalions of "chasseurs à pied," 4 regiments of Zouaves, 4 regiments of Algerian rifles, 2 regiments of foreigners, 4 battalions of African light infantry, 4 companies of "Fusiliers de discipline," and 4 regiments of Tonkin rifles.

As regards cavalry there are 13 regiments of cuirassiers, 31 of dragoons, 21 of chasseurs, 14 of hussars, 6 of Chasseurs d'Afrique, and 4 of Spahis.

There are 40 regiments of artillery, and 16 battalions of foot artillery with 10 companies of artillery laborers and 3 companies of artificers.

There are 7 regiments of engineers. In addition there are 8 companies of "cavaliers de remonte," 20 squadrons of military train, 26 legions of gendarmes, 20 sections of staff and recruiting clerks, and 25 sections of barrack laborers.

An infantry regiment consists of 3 battalions, each of which, divided into 4 companies, is 1000 strong.

The first 145 regiments of the line have, or will shortly have, 4th battalions which can be brought up to war strength when required, and which also furnish materials for the formation of regimental depots, which in peace time do not exist.

The act of the 4th March, 1897, conferred on the War Minister the power of raising these fourth battalions.

The 30 battalions of "chasseurs à pied" vary from 4 to 6 companies each, and have no depots; while of the regiments recruited from Tunis and Algeria, the 4 regiments of Zouaves have each 4 battalions of 4 companies with 2 depot companies, and the 4 regiments of Algerian rifles have each 4 battalions of 4 companies, and 1 depot company.

The 2 foreign regiments (*régiments étrangers*) consist of 5 battalions of 5 companies each, of which one is a depot company; they are recruited entirely from foreigners and no

Frenchman is permitted to serve in their ranks without obtaining the authority of the Minister of War to do so.

Every cavalry regiment has 5 squadrons, except the 1st Spahis which has 6; and the 79 regiments quartered in France are organized into independent cavalry divisions of 6 regiments each, and into brigades which are attached to the different army corps.

The 38 regiments of artillery are divided into 19 brigades, one of which is attached to each army corps. In every brigade, the regiment with the lowest number is the divisional one, and furnishes 3 batteries to each division and 3 ammunition sections; while the regiment with the highest number is the corps regiment, and detaches one of its 3 horse batteries for service with the independent cavalry division. Its other 9 batteries, it may be added, are field.

The supreme Military Council is the "Conseil supérieur de la guerre," of which the Minister of War is ex-officio president. This official is at present Divisional General Jean Batiste Billot, who is a Senator, and who was promoted to his present rank in 1878. His military cabinet consists of Brigadier General De Torcy, and Staff Colonel Meunier. The vice-president of the Council is Divisional General Eduard Fernand Jamont, promoted in 1885, who is virtually Commander-in-chief of the French army. The other members are Divisional Generals Saussier (late vice-president of the Council and Military Governor of Paris), de Negrier, Coiffé, Hervé, de France, Mercier, Giovannelli, Brugère, and Zurlinden (Military Governor of Paris). The chief of the General Staff is the council's reporter, and the deputy chief its secretary.

Of the above, Generals De France, Brugère, Giovannelli, Mercier, and Zurlinden are at present holding commands in addition. There are also technical committees for the staff (General De France being president) and for the infantry, the cavalry, and the artillery.

It may here be remarked that the offices of vice-president of the Council and Military Governor of Paris, which formerly were united in the person of General Saussier, have since been separated, and are now held respectively by Generals Jamont and Zurlinden.

The chief of the General Staff of the army is Divisional General Raoul François Charles le Monton de Boisdeffre, who was promoted to his present rank in 1892, and whose assistants (*sous chefs*) are Brigadier Generals Mathis and Gaston-Ovide. There are in the French army 110 divisional generals, and 220 Brigadier Generals. Divisional General Renouard is commandant of the "École Supérieure de Guerre" in Paris, or French Staff College, at which establishment captains and lieutenants of five-years' service and over undergo a two-years' course of instruction in staff duties. Cadet officers are trained at Fontainebleau for the artillery and engineers, and at Saint Cyr for the cavalry and the infantry; but non-commissioned officers who have been recommended for commissions are trained either at Saint-Maixent for infantry, at the artillery and engineer at Versailles, or at the cavalry school at Saumer.

The active army is divided, in addition to the Paris command, into 20 army corps, of which 19 are stationed in France and 1 in Algeria; and there are also 7 independent cavalry divisions, and an infantry division occupying Tunis, besides the colonial establishments, which are for the most part garrisoned by marines, of which there are 13 infantry and 2 artillery regiments.

The 7 independent cavalry divisions consist of 3 brigades of 2 regiments each. The 1st Division has its headquarters in Paris under General De Kermartin, the 2d at Lunéville under General Farny, the 3d at Châlons under General Mennessier de la Lance, the 4th at Sedan under General Colbert, the 5th at Rheims under General Count Duhesme, the 6th at Lyons under General De Boysson, and the 7th at Melun under General Briois. The troops are distributed as follows: To begin with Paris.

General Zurlinden, who was promoted to his present rank in 1890, is in command. He has been a Minister of War, and took over his present duties at the beginning of this year.

His chief staff officer is Colonel Perboyre, an engineer, and the troops in the command are the 6th Infantry Division under General Noellat, which consists of the 11th Brigade (24th and 25th Regts.), and the 5th Brigade (5th and 119th Regts.): the 7th division under General Jollivet, which consists of the 13th

Brigade (101st and 102d Regts.), and the 14th Brigade under General De Luxer (103d and 104th Regts.); and the 9th Division under General Florentin, which consists of the 17th Brigade (4th and 32d Regts.) and the 18th Brigade (113th and 131st Regts.). The 1st Cavalry Division under General Henri de Kermartin, consisting of the 2d Brigade of Cuirassiers (1st and 2d), the 5th Brigade of Dragoons (27th and 28th), and the 4th Brigade of Chasseurs (17th and 18th), and the artillery of the cavalry division. The 3d and 19th Brigades of Artillery, consisting of the 11th, 22d, 12th and 13th Regts.; 2 regiments of engineers, 19th and 20th squadrons of military train, and the 16th battalion of foot artillery.

In addition the command includes the 162d Regiment of Infantry, and the 29th Battalion of Chasseurs, which are not brigaded, and 4 battalions of marine infantry, not to speak of republican guards, fire brigade, gendarmerie, etc.

Of the above troops, the majority, as will be presently seen, really belong to different army corps although quartered in the Paris command.

The combatant troops of the 20 army corps are set out below in a tabulated form :

I. ARMY CORPS.

H. Q. Lille. Division General (général de division) De France.

INFANTRY.				CAVALRY.	ARTILLERY.
1st Division.		2d Division.		1st Brigade.	1st Brigade.
1st Brigade.	2d Brigade.	3d Brigade.	4th Brigade.	—	—
43d Regt.	1st Regt.	33d Regt.	8th Regt.	21st Dragoons	15th Regt.
127th Regt.	2d Regt.	73d Regt.	110th Regt.	19th Chasseurs	27th Regt.
Also 143d Regt., 16th Chasseurs, 4th Brig. Cuirassiers, 3d Engineers, 1st Foot Artillery.					1st Bn. Engs.

II. ARMY CORPS.

H. Q. Amiens. Division General Brugère.

INFANTRY.				CAVALRY.	ARTILLERY.
3d Division.		4th Division.		2d Brigade.	2d Brigade.
5th Brigade.	6th Brigade.	7th Brigade.	8th Brigade.	—	—
120th Regt.	57th Regt.	54th Regt.	45th Regt.	5th Dragoons.	17th Regt.
128th Regt.	72d Regt.	67th Regt.	87th Regt.	3d Chasseurs.	29th Regt.
Also 145th Regt., 5th Cav. Div., 3d Engineers Regt., 2d Bat. Artillery.					2d Bn. Engs.

III. ARMY CORPS.

H. Q. Rouen. Division General Giovanelli.

INFANTRY.				CAVALRY.	ARTILLERY.
5th Division.		6th Division.		3d Brigade.	3d Brigade.
9th Brigade.	10th Brigade.	11th Brigade.	12th Brigade.	—	—
39th Regt.	36th Regt.	24th Regt.	5th Regt.	6th Dragoons.	11th Regt.
74th Regt.	124th Regt.	28th Regt.	119th Regt.	6th Chasseurs.	22d Regt.
					3d Bn. Engs.

Also 20th Chasseurs à pied, 1 battery Artillery.

IV. ARMY CORPS.

Mans. Division General Mercier.

INFANTRY.				CAVALRY.	ARTILLERY.
7th Division.		8th Division.		4th Brigade.	4th Brigade.
13th Brigade.	14th Brigade.	15th Brigade.	16th Brigade.	—	—
101st Regt.	103d Regt.	124th Regt.	115th Regt.	1st Chasseurs.	26th Regt.
102d Regt.	104th Regt.	130th Regt.	117th Regt.	14th Hussars.	34th Regt.
					4th Bn. Engs.

Also 13th Cuirassiers.

V. ARMY CORPS.

Orleans. Division General Duchesne.

INFANTRY.				CAVALRY.	ARTILLERY.
9th Division.		10th Division.		5th Brigade.	5th Brigade.
17th Brigade.	18th Brigade.	19th Brigade.	20th Brigade.	—	—
4th Regt.	113th Regt.	46th Regt.	31st Regt.	1st Dragoons.	30th Regt.
82d Regt.	—	89th Regt.	76th Regt.	7th Chasseurs.	32d Regt.
					5th Bn. Engs.

Also 29th Dragoons, 4th Hussars, 7th and 18th Dragoons.

VI. ARMY CORPS.

Châlons sur Marne. Division General Kessler.

INFANTRY.				CAVALRY.	ARTILLERY.
12th Division.		40th Division.		6th Brigade.	6th Brigade.
23d Brigade.	24th Brigade.	70th Brigade.	80th Brigade.	—	—
91st Regt.	147th Regt.	94th Regt.	150th Regt.	12th Chasseurs.	25th Regt.
132d Regt.	148th Regt.	106th Regt.	161st Regt.	6th Hussars.	40th Regt.
					6th Bn. Engs.

Also 9th Battn. Chasseurs, 18th Battn. Chasseurs, 1st Chasseurs, 25th and 26th Chasseurs.

THE FRENCH ACTIVE ARMY.

VII. ARMY CORPS.

H. Q. Besançon. Division General Pierron.

INFANTRY.				CAVALRY.	ARTILLERY.
13th Division.		14th Division.		7th Brigade.	7th Brigade.
25th Brigade.	26th Brigade.	27th Brigade.	28th Brigade.	—	—
44th Regt.	21st Regt.	23d Regt.	35th Regt.	13th Dragoons	4th Regt.
60th Regt.	109th Regt.	133d Regt.	42d Regt.	11th Chasseurs	5th Regt.
Also 151st Regt., 3d Battn. Chasseurs, 1st Brig. 6th Cav. Div., 3d Brig. 7th Cav. Div., 7th and 10th Battn. Foot Artillery.					7th Bn. Engs.

VIII. ARMY CORPS.

H. Q. Bourges. Division General Caillaud.

INFANTRY.				CAVALRY.	ARTILLERY.
15th Division.		16th Division.		8th Brigade.	8th Brigade.
29th Brigade.	30th Brigade.	31st Brigade.	32d Brigade.	—	—
56th Regt.	10th Regt.	85th Regt.	13th Regt.	26th Dragoons	1st Regt.
134th Regt.	27th Regt.	95th Regt.	29th Regt.	16th Chasseurs	37th Regt.
Also 5th Battn. Chasseurs, 8th Chasseurs (Cav.).					8th Bn. Engs.

IX. ARMY CORPS.

H. Q. Tours. Division General Riff.

INFANTRY.				CAVALRY.	ARTILLERY.
17th Division.		18th Division.		9th Brigade.	9th Brigade.
33d Brigade.	34th Brigade.	35th Brigade.	36th Brigade.	—	—
68th Regt.	114th Regt.	32d Regt.	77th Regt.	25th Dragoons	20th Regt.
90th Regt.	125th Regt.	66th Regt.	135th Regt.	7th Hussars.	33d Regt.
Also 18th Battn. Chasseurs, 6th Regt. Engineers, 3d and 6th Cuirassiers.					9th Bn. Engs.

X. ARMY CORPS.

H. Q. Rennes. Division General Lucas.

INFANTRY.				CAVALRY.	ARTILLERY.
19th Division.		20th Division.		10th Brigade.	10th Brigade.
37th Brigade.	38th Brigade.	39th Brigade.	40th Brigade.	—	—
48th Regt.	41st Regt.	25th Regt.	2d Regt.	24th Dragoons	7th Regt.
71st Regt.	70th Regt.	136th Regt.	47th Regt.	13th Hussars.	10th Regt.
Also 15th Battn. Foot Artillery.					10th Bn. Engs.

THE FRENCH ACTIVE ARMY.

415

XI. ARMY CORPS.

H. Q. Nantes. Division General Brault.

INFANTRY.				CAVALRY.	ARTILLERY.
21st Division.		22d Division.		11th Brigade.	11th Brigade.
41st Brigade.	42d Brigade.	43d Brigade.	44th Brigade.	—	—
64th Regt.	93d Regt.	62d Regt.	10th Regt.	3d Dragoons.	28th Regt.
65th Regt.	137th Regt.	116th Regt.	118th Regt.	2d Chasseurs.	35th Regt.
					11th Bn. Engs.

XII. ARMY CORPS.

H. Q. Limoges. Division General Guioth.

INFANTRY.				CAVALRY.	ARTILLERY.
23d Division.		24th Division.		12th Brigade.	12th Brigade.
45th Brigade.	46th Brigade.	47th Brigade.	48th Brigade.	—	—
63d Regt.	107th Regt.	50th Regt.	14th Regt.	20th Dragoons	21st Regt.
78th Regt.	138th Regt.	180th Regt.	80th Regt.	21st Chasseurs	34th Regt.
					12th Bn. Engs.

XIII. ARMY CORPS.

H. Q. Clermont-Ferrant. Division General Jacquemin.

INFANTRY.				CAVALRY.	ARTILLERY.
25th Division.		26th Division.		13th Brigade.	13th Brigade.
49th Brigade.	50th Brigade.	51st Brigade.	52d Brigade.	—	—
16th Regt.	86th Regt.	98th Regt.	92d Regt.	30th Dragoons	16th Regt.
38th Regt.	139th Regt.	121st Regt.	105th Regt.	10th Chasseurs	36th Regt.
					13th Bn. Engs.

XIV. ARMY CORPS.

H. Q. Lyons. Division General Zédé.

INFANTRY.				CAVALRY.	ARTILLERY.
27th Division.		28th Division.		14th Brigade.	14th Brigade.
53d Brigade.	54th Brigade.	55th Brigade.	56th Brigade.	—	—
75th Regt.	22d Regt.	30th Regt.	97th Regt.	4th Dragoons.	2d Regt.
140th Regt.	96th Regt.	52d Regt.	99th Regt.	1st Hussars.	6th Regt.
					14th Bn. Engs.

Also 157th, 158th and 159th Regts., 11th, 12th, 13th, 14th, 22d, 28th and 30th Battalions of Alpine Chasseurs, 7th and 10th Cuirassiers, 19th Dragoons, 11th Battn. Foot Artillery, 4th Regt. Engineers.

XV. ARMY CORPS.

H. Q. Marseilles. Division General Metzinger.

INFANTRY.				CAVALRY.	ARTILLERY.
29th Division.		30th Division.		15th Brigade.	15th Brigade.
57th Brigade.	58th Brigade.	59th Brigade.	60th Brigade.	11th Dragoons	19th Regt.
55th Regt.	111th Regt.	58th Regt.	3d Regt.	9th Hussars.	38th Regt.
112th Regt.	141st Regt.	163d Regt.	61st Regt.		15th Bn. Engs.
Also 7th, 23d, 24th and 27th Alpine Chasseurs, 14th, 15th, 16th, 17th and 18th Battalion, 19th Artillery Regt., 7th Battn. Engineers, 13th Foot Artillery.					

XVI. ARMY CORPS.

H. Q. Montpellier. Division General Des Garets.

INFANTRY.				CAVALRY.	ARTILLERY.
31st Division.		32d Division.		16th Brigade.	16th Brigade.
61st Brigade.	62d Brigade.	63d Brigade.	64th Brigade.	17th Dragoons	3d Regt.
17th Regt.	81st Regt.	12th Regt.	15th Regt.	13th Chasseurs	9th Regt.
122d Regt.	142d Regt.	100th Regt.	143d Regt.		16th Bn. Engs.
Also 2d Regt. of Engineers.					

XVII. ARMY CORPS.

H. Q. Toulouse. Division General De Sesmaisons.

INFANTRY.				CAVALRY.	ARTILLERY.
33d Division.		34th Division.		17th Brigade.	17th Brigade.
65th Brigade.	66th Brigade.	67th Brigade.	68th Brigade.	10th Dragoons	18th Regt.
7th Regt.	11th Regt.	83d Regt.	59th Regt.	9th Chasseurs.	23d Regt.
9th Regt.	20th Regt.	126th Regt.	88th Regt.		17th Bn. Engs.

XVIII. ARMY CORPS.

H. Q. Bordeaux. Division General Varaigne.

INFANTRY.				CAVALRY.	ARTILLERY.
35th Division.		36th Division.		18th Brigade.	18th Brigade.
69th Brigade.	70th Brigade.	71st Brigade.	72d Brigade.	15th Dragoons	6th Hussars.
6th Regt.	57th Regt.	34th Regt.	18th Regt.	6th Hussars.	18th Bn. Engs.
123d Regt.	144th Regt.	49th Regt.	53d Regt.		
Also 16th Battn. Foot Artillery. Bayonne Defenses.					

XIX. ARMY CORPS.

H. Q. Algeria. Division General Larchey.

INFANTRY.					
Algeria Division.		Oran Division.		Constantine Division.	
1st Inf. Brig.	1st Cav. Brig.	2d Inf. Brig.	3d Inf. Brig.	4th Inf. Brig.	3d Cav. Brig.
1st Zouaves.	1st Chasseurs d'Afrique.	2d Zouaves.	1st Foreign Regiment.	3d Zouaves.	3d Chasseurs d'Afrique.
1st Rifles.	5th Chasseurs d'Afrique.	2d Rifles.	2d Foreign Regiment.	3d Rifles.	3d Spahis.
	1st Spahis.				
Not Brigaded.		2d Cavalry Brigade.		Not Brigaded.	
2d African Battalion, 14th, 17th, 18th and 20th Batteries of 12th Regt.		2d Chasseurs d'Afrique.		5th African Battalion.	
		2d Spahis.		14th, 15th, 18th and 20th Batteries of 13th Regt.	
		Not Brigaded.			
		1st African Battalion.			
		13th, 15th, 16th and 19th Batteries of 12th Regt.			

DIVISION OCCUPYING TUNIS.

Infantry Brigade—4th Zouaves, 4th Rifles, 3d African Light Infantry.

Cavalry Brigade—4th Chasseurs d'Afrique, 4th Spahis.

Not Brigaded—4th African Light Infantry.

THE REORGANIZATION OF OUR STATE TROOPS.

BY COLONEL JAMES G. GILCHRIST, IOWA N. G. (RETIRED.)

THE call for volunteers in April last resulted in such absolute disappointment to those of long service with State troops and such utter collapse of the whole State military organizations, that the opportunity afforded by the cessation of hostilities should stimulate all to lend their aid towards effecting a readjustment on new lines. Whether this result was due to inherent defects in the so-called "National Guard" system or to the injection of political methods, or both, the effect remains as stated. Hostility or indifference on one hand, and ignorant enthusiasm on the other have hitherto rendered the subject a hopeless one. Now, the whole country is alive to the necessity for a better organization, and the time is propitious for intelligent action.

As a preliminary, let us note the particular defects that have been demonstrated to exist in our present militia system:

1. Attempt to divide authority between State and United States.

2. Weak staff organizations.
3. Unwieldy organizations.
4. Incapacity of commanding officers.
5. Poor physique of the men.
6. Social obstacles among the men.
7. Political methods.

1. The greatest difficulty—because if all else were normal, this would cripple efficiency—has been the attempt to divide authority between the State and General Government. An efficient volunteer force must not have a divided allegiance. In time of war the organized troops of a State must be subject to the United States alone. All attempts to devise a compromise have hitherto failed, and under present conditions must do so in the future. The experiences of the present mobilization, in many of the States, would have been ludicrous were they not so shameful and mortifying. Armed bodies, calling themselves "companies" and "regiments" dictating the conditions under

which they would consent to serve, may have presented an instructive spectacle, but none the less humiliating.

I cannot see any particular constitutional difficulty in the way of a law providing that in times of peace the military force of a State shall be under the command of its Governor, but may be permitted, for service under the United States, on emergencies short of general war, to volunteer at request of the President. In time of war, *general* war, the proclamation of such a condition of hostilities, by the President of the United States, shall, without any additional formality, at once place all these State troops in the United States service, subject to orders from the Adjutant-General's Office in Washington. The sole authority that the United States shall exercise over State troops, in times of peace, shall be to insure, by regular inspection, that they are at all times in a condition for service, in all things, numbers, equipment and efficiency. As a compensation to the State for this partial usurpation of its powers, the United States should assume the complete equipment of the troops, so that they should at all times be ready to take the field for any service on telegraphic orders. As we shall probably never have such a small army as we had before the Spanish war, and thus have more men available for the first line, it might be a good plan to call these State troops "U. S. Reserves," and "link" them either to regular regiments, or as reserve battalions, if separate regimental organizations are thought undesirable. It is also possible to have two organizations in each State, one, if desired, as now provided, and another based upon plans from the War Department, as above suggested, with a view to giving each regiment in the army one or more battalions, sufficient to double the strength of the army when mobilized. These battalions to be known as "such and such" a battalion, of "such and such" a regiment; a sort of "depot battalion." At all events the first objection, of a divided authority, is surely not insuperable.

2. The most painful experience, in the present war, has been the loss of life from what would seem to be preventable diseases, and suffering from insufficient supplies, as well as defective transportation. Part of this, no doubt, has been due to sudden expansion in personnel, with lack of equipment in arsenals and

depots. Admitting all this, which seems unavoidable under our former system—the greatest suffering and discomfort, which is synonymous with “inefficiency,” has been due to the incapacity of the volunteer staff. No State, not one, seems to have had a staff corps in anything but name. Boys, both in years and experience, were given commissions as commissaries, quartermasters, adjutants-general, and inspectors-general, often with preposterous rank, sometimes outranking experienced officers who were so unfortunate as to be associated with them. There are numerous instances of volunteers suffering for the actual necessities of life, side by side with Regular troops who were amply supplied. Much of this, of course, was due to the ignorance of the volunteer officers of the field and line, and will receive notice later. In reorganizing the State troops the staff should receive first attention. A logical arrangement would be, it seems to me, something like the following: Instead of the customary “staff,” called so by courtesy, have a working one, for use and not ornament. There should be an Adjutant-General, with rank not above that of colonel; Inspector-General, Quartermaster and Commissary-General, of rank not to exceed that of major; Surgeon-General, rank of colonel, and an Ordnance officer, not above the grade of captain. Such officers as Engineer officer, Judge Advocate, or Paymaster-General, are not necessary; some of them have no legitimate duty with such a small force as most of the States will maintain. Others require technical knowledge that a civilian cannot be supposed to possess, and the functions of others can be performed by State officers already in existence, as the Attorney-General and treasurer. The Governor may be allowed two aides, with rank of captain.

The Adjutant-General should be appointed from the line, one who has had ample experience with troops, and of proved capacity. His appointment should be without the faintest tinge of politics, and he should only be removable for cause, and sentence of a court-martial. He should be retired at a certain age, say 64 years. His office staff should be second lieutenants in the line, for the purpose of training in administration and office details. As far as practicable battalion adjutants should be obtained by promotion from this office.

The Inspector-General should be a captain or lieutenant from the army, active or retired, of character and approved capacity, whose duties would be somewhat complex. He would be the military adviser of the Governor and Adjutant-General, and act, also, as Quartermaster and Commissary-General, having an office force made up of second lieutenants appointed from the line, and enlisted men as sergeants in both departments.

The Surgeon-General, obtained by promoting the senior medical officer, should have an assistant, and all the hospital stewards in the service should serve in rotation as the clerical staff in the office.

The Ordnance officer, where a retired officer cannot be procured, may be appointed, by selection, from the line, and the duties of superintendent of small-arms practice should be added to his department.

Two things are secured by a system such as the above: First, officers are educated in staff duty, and, secondly, political appointments are impossible. None of the staff are to be removable, excepting for cause, on sentence of a court, or by promotion.

3. Unwieldy Organizations.—All division and brigade organizations should be broken up. Few States should have any larger commands than battalions; when more than two battalions are serving together for State duty, a provisional regiment can be formed, and when called into the service of the United States regiments are to be organized with an army officer in command, or the battalions join the regiment they are "linked" to, as may be desired. The organization should not be entirely at the will of a State; the whole matter should be a subject for careful and scientific treatment, based on probable military necessity: First, based on the authorized strength of the army, the War Department fixes the number of battalions necessary: Next, centres of population, facilities for mobilization, with some reference to possibilities as to *kind* of service must be considered, and each State assigned its quota, and the proportion of the several arms. Thus heavy artillery would be organized only on sea-coasts, lake-coasts, or frontier, north and south; cavalry in the middle Western States, and so on. Nothing is to be left to the caprice of the individual States; all must be arranged

with a view to efficiency. The companies must be maintained at full strength, have a certain amount of training, and at all times be prepared to take the field on the shortest notice.

4. *Commanding Officers.*—All things being equal, the troops with good officers will do better service and in all things show greater efficiency than those with poor ones. In this sense "efficiency" means drill, discipline, and health. To a considerable extent the officers are quite as responsible for the latter item as the medical corps; it is a matter of education, as to the officers, and discipline as to the men. Next to the wretched staff, the weakest point in the old National Guard organization was the inefficiency of the field and line. This incapacity was many-sided. Too much stress was laid upon mere drill, and not enough on discipline. This was due to the manner of appointment to commission, the similar social status of officer and man, the youth of the officers, and their imperfect education. The election system could not be expected to give good results; to make it a matter of appointment, by the Governor, or anyone else, would be even worse, as political methods would be sure to creep in. The so-called examinations were a farce, even if any were prescribed, as more attention was paid to knowledge of the drill regulations and ceremonies, than to military knowledge. It is perfectly possible to institute a better system, one that would result in securing the best material for higher commands, company and battalion. For instance, the line of promotion should commence with corporal, and so on to the top. In the reorganization, appointments would be a necessity for original vacancies; but afterwards it would be a system of promotion, from highest to lowest, tempered by adequate examination and practical test. Commence with the company, as this unit would be the first to be organized. Appoint as captain a man not less than thirty-five years of age, of social position that would give him standing in the community in which he lives, of service, of some kind, that has given him some conception of his duties and responsibilities, and require him to submit to an examination, by a competent military board. He will then receive an acting appointment, his commission to come, after from three to six months, should he prove his fitness. When his company is enlisted, a careful

test of the qualifications and aptitude of a number of the most promising men should be made, and an *acting* appointment of first sergeant made. The first lieutenant can then be appointed, and must be a man of thirty years of age, of equal social status with the captain, his confirmation determined by a probationary service. He should be one who has seen plenty of service of some adequate kind, if possible a graduate from a military college, or from one having a military department under an army officer. The same routine is followed as to second lieutenant, with less stress upon service, age not under twenty-five. The non-commissioned force is next to be slowly and carefully organized, all appointments to be acting, until efficiency is shown, and then made permanent. When four companies are fully organized in this manner, then the battalion will be formed.

In the beginning the major commanding should be an army officer, if possible to secure one; a retired officer could take an appointment, for purposes of instruction and administration. The staff, both commissioned and non-commissioned, will be appointed, as far as possible, from the office force in the various departments. Should any vacancies remain, they can be filled with the same precautions, and in the same manner as in the case of company officers. It might be possible to procure retired non-commissioned officers for the more important positions, such as sergeant-major. It may be objected that this method of organizing offers little inducement for young men to enlist. Perhaps so, but we are to have a *military* force in the future, we hope, and the first essential is efficiency.

After all original vacancies are filled, and the battalion fully organized, subsequent vacancies are to be filled only by lineal promotion, conditioned upon thorough examination. Every vacancy is to be filled by promotion from below, the successful candidate to secure an "acting" appointment for some specified time, say one month—commission to follow if the probation is creditably passed. Failure to pass successfully the examination must give the next on the list an opportunity. Should an officer fail in two examinations, he must be dismissed. Vacancies in the grade of second lieutenant must be especially provided for. A certain proportion, say three-fifths, are to be filled by promotion from the ranks, preferably sergeants; after a rigid

examination, the candidate being carried on a roll of "candidates," during which time he is critically under observation. Two-fifths of such appointments should come from among graduates from schools under State supervision, where military science and art is taught, by an officer of the army, preference being given to those who are reported by the military instructor as particularly qualified. It will not be difficult to maintain such a system; every fourth and fifth vacancy going to such graduates.

5. Physical qualifications for enlisted men, it can be quickly stated, must be the same as for the army.

6. Social status of the men.—The point of chief interest under this head, is that a man must be unmarried, and with no one depending upon him for maintenance. This was the one thing that took the largest percentage of our National Guard regiments out of the service, wives, mothers, or dependent relations being deprived of support. Of course, if a young man is independent in money matters, the case would be different, but even then married men are not to be desired. The men must be in a position that will enable them to leave their work at any time, on the shortest notice. The men again, should be held to their full period of enlistment, transferred from company to company, even if in different States, or kept within reach by mail or telegraph. Unauthorized removals, or failure to report addresses, will be tantamount to desertion unless excused.

7. Political methods, it should go without saying, must be rigidly avoided. Appointments, promotions, and service must not be tainted by a suspicion of political reward or punishment. This must be rigidly maintained, from Adjutant-General down. The only "military" gifts left with the Governor, will be his two aides, and this concession to the purely ornamental may be permitted.

Something remains to be said of some matters of detail, bearing in mind that the battalion is the largest command, excepting, possibly, in the large cities, where one or more regiments may be organized. Another point that must be emphasized, is that the troops organized as a reserve are apportioned solely on military considerations, a force for service, not in any sense for display.

Equipment must first receive attention. This is to be determined solely with reference to utility. Officers and men alike will be furnished with, or require to have, two uniforms, undress, with cap, and campaign with hat and leggins. Haversacks, with all adjuncts, canteens, with shelter-tents, blankets, ponchos, and all material necessary for a campaign. Officers should have both sword and revolver, and only service-belts issued to the men. There should be a supply of clothing suitable for different seasons: overcoat, and heavy underwear, with light clothing for warm weather. Each company must be supplied with cooking-range, and all kitchen furniture; tools for intrenching and the like; wagon, and harness, and all material needed in the field. Staff officers must have all necessary books, blanks, etc., with portable field desk; medical supplies, tent for hospital, and everything needed for the care of the sick and injured. In brief, the battalion must be in a condition for active service on the shortest notice, with nothing to provide, at the last moment, excepting rations and horses, and these can be arranged for in advance. To insure constant readiness, there must be careful and frequent inspections.

Instruction must be thorough, and not confined to mere drill. It must include schools for officers, non-commissioned officers and men; field exercises, annual encampments and practice marches, and target practice. Once a year, at least, three or more battalions must be united for regimental drill and manoeuvres, and at longer intervals, mobilization of large bodies, combined with Regular troops, ought to be had. Each company, in small towns, or battalions in larger places, should have a suitable armory, with ample space for drill, storage, and the like; suitable offices, kitchen, and sleeping accommodations for the men in cases of necessity. It should be defensible against mobs, and situated so that it will have considerable open space around it, and not commanded by neighboring buildings. A guard must be quartered in the building, either permanently, or by a system of reliefs. The first sergeant, in the case of company armories, or sergeant-major, in the case of battalions, must be in charge of the building and live there.

Pay must be provided in somewhat more liberal fashion than has hitherto obtained. Certain officers must give their whole

time to the service, and receive the same pay and allowances as similar grades in the army. All officers and men must receive the same pay and allowances as similar grades in the army when on any duty, drill, camp, march, target practice, or in service. Adjutants of battalions, when separate, or of regiments when such are organized, will be on constant duty, and receive full pay and allowances. Sergeant-majors of regiments, or of battalions where they have a battalion armory, must also devote their whole time to their duty, and receive full pay. The same must apply, under similar circumstances, to all non-commissioned staff, including quartermaster and commissary-sergeant, and hospital steward. First sergeants must all be on full pay and constantly on duty, acting as custodians, drill sergeants for recruits, and armorers. The pay-roll would not be much heavier than the hitherto wasteful expenditure has been, but should it be twice as much it would be money well spent. Furthermore, the question of pay could be divided between the State and National Government in some equitable manner.

Finally, it must be noted, that in the beginning of this reorganization, army officers, as far as possible, should be secured, in order to start it on right lines.

GENIUSES.

BY MAJOR JAMES CHESTER, U. S. ARTILLERY (RETIRED).

"Time, place, and action may with pains be wrought,
But Genius must be born, and never can be taught."—DRYDEN.

IN the English language, and indeed in all languages, the same word is often used to express a variety of meanings, and authors are sometimes misunderstood in consequence. It is necessary, therefore, as a preliminary to any discussion of geniuses, to state distinctly what we mean by the word.

The word genius is not a rare word, but it is peculiar; not so much because it has many meanings as because it has peculiarities of form. Geniuses and genii are both correct plural forms of the singular noun genius; but geniuses are men and genii are spirits. The man who is prompted and led by a spirit is called a genius, and the spirit that prompts him is known by the same name. But in the plural those are geniuses and these are genii.

Strictly speaking, all men are geniuses; but custom has restricted the use of the word to such men as excel in some specialty by reason of a deeper insight into its mysteries than is common among men, and a clearer and seemingly instinctive discernment of the rights and wrongs of it.

Religion and philosophy are at present inclined to turn their backs on genii—the wicked kind as well as the wise and virtuous. Christianity as formulated into churchmanship seems to have no use for them. But it was not always so. The founder of Christianity and his immediate followers recognized their existence in the broadest sense. They taught that the human soul and body constituted a habitation for spirits, and were a temple when occupied by the Holy Ghost. And generally, that the man was what he was because of the spirit that was in him. And the dogma was not peculiar to Christianity. It was the common belief in the ancient world, and is still held by perhaps the majority of men. No dogma has ever been so universally accepted. That every man has a tutelar spirit or demon, within him, that prompts him to good or evil deeds;

reveals the true and the beautiful to him or hides them from him, and stands his spiritual guide and adviser in all difficulties and dangers, is very generally believed by Christian and Pagan, Mahomedan and Jew. But modern theologians seem to be dissatisfied with the belief. It is inconsistent with their ideas of God and his government, and so they reject it. Still, their ideas of God and his government may be wrong. They are learned rather than wise theologians. They have extracted a doctrine from certain books and then created a divinity to suit the doctrine. In other words, they have made a god in the likeness of man, and devised suitable methods of government for him, and wonder why the world is so slow to adopt their ideas. The Jehovah of their imagination is a being of infinite loving kindness, who never would permit gravitation to dash the brains out of an infant transgressor of its laws. They cannot see the "Hidden things of God" in the universe around them. They cannot read his will in the history of nations and the lives of men. They know nothing of "God's open secret," and therefore do not believe that any such secret exists.

But whether they believe it or not the secret is there. Every genius is a genius because of the spirit that is in him. Is he a poet, it is because his genius—his indwelling spirit—gives him vivid perceptions of the good, the beautiful, the true. The perception, the spiritual picture, is the grand original of his poem. The words in which he tries to reproduce it are no part of the inspiration. The indwelling spirit has nothing to do with them. The picture is the revelation.

Poets, and indeed all kinds of geniuses, are men who can see deeper into appearances than other men; who can discern the truth or falsehood that is in them. They are seers like the prophets of old. They may be poets, painters, or sculptors; they may be inventors or reformers; and they may be rulers, teachers or commanders of men. Whatever they are, the spirit that is in them has made them. Their professional skill is human; but their mental visions, their courage, judgment and divine faith are not.

When a man has a spiritual vision his first impulse, after the ecstasy, is to record it—to paint it; sculp it; describe it or give it bodily form in some way, so that other minds may be

able to discern it. Hence works of art. But such productions are necessarily imperfect representations of the revelation. They are tainted with the imperfections of humanity. And this is especially so when the revelation calls for action and not description. Rulers, reformers and commanders of men must translate their revelations into action if they are to be beneficial to mankind. They see the facts of the problem in their vision. That constitutes the revelation. The action predicated on the revelation is prescribed by professional skill.

A military genius reads the mind of his adversary in the revelation. He knows instinctively the kind and quantity of evidence required to establish an idea in such a mind; or to disestablish the idea after it has been adopted. From data always obtainable by a commander in the field, he can, by the spirit that is in him, diagnose his adversary's intentions, hopes and fears. This is the advantage that a genius has over the ordinary kriegsspieler. But he must also have professional skill. A genius without skill might be a failure. A skilful genius must be a success.

The collection of data is human work, the diagnosis is spiritual; the prognosis and the action are a combination of the two. The collector of data must be a skilful man, honest and true, brave and experienced. But he need not be a genius. The man who deals with the data, diagnoses the situation, plans the action and prognosticates its course ought to be one. But geniuses are so rare that nine times out of ten he is not one.

The coöperation of a genius with the spirit that is in him is so close, intimate, secret and harmonious; and the conclusions reached are so clear, distinct and unanimous, that the genius is altogether unconscious of any coöperation at all. Spirits ever speak in "a still, small voice," and their promptings, whether for good or evil, are so natural and seductive, as to seem the result of the man's own reasoning. The genius is the last man to suspect occult assistance in the solution of his problems. He is always modest, and if a military genius, reticent. While he never doubts the revelation of his vision, or the truth and wisdom of the solution which he has based thereon, he would hesitate to undertake their demonstration to a third party. They are, even to himself, by no means the result of ratiocina-

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tion. They came into his mind intuitively. He is satisfied that they are true, and yet, he doubts if others could be made to believe them. Moreover, he feels that they are his weapons and not to be given away. This is characteristic of all great commanders.

It is a mistake to assume that a military genius in command of an army has no hard work to do ; to think that he can shut his eyes and see the solution of any military problem in a moment. Geniuses are never assisted to that extent. Even the Holy Spirit, the Great Teacher of Righteousness, which proceedeth directly from the Father of Spirits, is restricted in his methods. We are told that "What things soever he shall hear these shall he speak." (John xvi, 13.) There is a whole volume of spiritual doctrine in that short sentence. The indwelling spirit hears before he speaks. He originates nothing. The data must be laid before him—all the evidence in the case. Then he separates the true from the false and produces the mental vision which is the revelation of facts. This is the diagnosis, the grand original of every artistic work.

Proud of the beauty and sure of the truth of his mental vision the genius proceeds to utilize it for the edification or correction of men. If he be a teacher he reproduces his vision in a poem, or a picture, or some other work of art. If he be a hero, a commander of men, the vision forms the ground work of his plan of battle or campaign. He sees in it how to apply "The Scourge of God" to the back of his adversary with advantage and effect. In this the spirit assists, not by prescribing military manœuvres ; but by exhibiting the intentions, hopes and fears of the adversary ; the character of his mind, and the strength and composition of his army. The materials from which the spirit deduces this important information are : the data already collected ; the genius's personal knowledge of his opponent ; and the plan suggested by his professional skill, or those parts of it prescribing manœuvres which will be visible to, or discoverable by, the adversary. The mental effects on, and counter manœuvres by, the adversary on account of his observations and discoveries will be exhibited in subsidiary pictures of a less positive character than that exhibited in the diagnosis. This is the prognosis.

The diagnosis with its distinct and abiding picture, and the prognosis with its subsidiary pictures more or less uncertain, are the military genius's preparation for action. He carries them about with him, in his head, and can consult them at any time and anywhere. The subsidiary pictures are uncertain because the data are necessarily doubtful. At least this is so frequently the case that military writers deprecate planning a campaign beyond first contact with the enemy. It is assumed that everything after that must be uncertain. Still, if the data for the diagnosis have been carefully collected; if the commander's knowledge of his adversary is sufficient; and above all if the commander is a genius, not only will the diagnosis be correct, but the prognosis will be sufficiently so for continuous action. Of the subsidiary pictures many will have to be cast aside during the action; but the true picture will flash into brilliancy at the proper moment and all the others will disappear. And so the continuity of the action or operation will suffer no injurious disturbance.

We have said that, strictly speaking, all men are geniuses, but that custom has restricted the use of the term. This, perhaps, calls for some explanation. We hold that the human body is a construction while the human soul is a creation direct from the hand of God. Also that both are dead and without self-consciousness until occupied by some preëxisting spirit. When a spirit takes possession, the man's personality is born into existence. So self-consciousness, individuality, and thought of any kind are due to the presence of an indwelling spirit; and all men exhibiting such mental characteristics are, strictly speaking, geniuses of a kind. But "The mind of the Spirit," to use a pauline expression, is of infinite variety, extending from Infinite Wisdom to spirits that are deaf and dumb and blind, and bound to believe a lie. Hence the necessity for restriction in the use of the term. Still, it is impossible to say where the line should be drawn.

Geniuses are rare in any walk of life. Most people will admit that poets and painters worthy of the name are very rare—rarer than blossoms on the century plant. And yet inspired poets are less rare than inspired soldiers. This may be because poets have an easy way of revealing themselves. Assuming

that the visions of truth are equally vivid in the minds of the soldier and the poet, in other words, that their inspirations are equal, their opportunities of utilizing them for the edification or correction of men are very unequal. The poet's efforts are always in season. The military genius rarely gets a chance. Then the poet reproduces his vision in words; the soldier must translate his into action.

In searching for geniuses on the pages of history one cannot safely take success as a sure indication of inspiration. Sometimes, even in the case of poets, the inspiration passes their immediate power of utterance, and the word picture of their vision, though it may express the truth, will have little or none of that rhythm which gives charm to poetical productions. Thomas Carlyle was a poet of no mean order. He probably saw deeper into the truth of appearances than any man of his century. But his temper, or his dyspepsia, or the necessities of the case, demanded instant reproduction of his visions; and many a gem, worthy of a lifetime's labor in beautifying, was thrown upon the world unpolished and uncut.

If that be so in the case of a poet, how much more must it be so in the case of a military genius. For the former the time is always propitious. A quire of paper and a pencil sets him up in business. He can produce pictures of his mental visions at will, and spend the remainder of his life in perfecting and polishing them. There is nothing sordid about the real poet. The pleasure of contemplation is ample reward for him. He cares nothing for applause. Shakespear had been dead for over a century before the world began to appreciate his work. But his work would keep and his fame could wait.

It is very different with the military genius. As already said, his chances are few. He cannot test his powers experimentally; and when his opportunity offers he has no time to perfect and polish his plans. Then he is not sure that he is a genius. True, he has dazzling visions of the real problem before him, but everything seems so obvious that he imagines everybody sees it.

The unrecognized military genius in the presence of a military emergency must be miserable if matters are mismanaged. The visions that flash through his mind during such an emer-

gency must be torture. Fancy the feelings of Napoleon on the 10th of August, 1792, as he stood in the crowd that witnessed the massacre of the Swiss Guard. There he stood, a military genius, unrecognized, and for the moment out of a job; the only man perhaps, in all that multitude, that had a clear perception of the situation and its possibilities. How he must have longed to take command of that heroic handful, and show the world what genius could do with valor. "If they had a commander they would conquer," he exclaimed. Perhaps he fancied that for him, the road to fame began there, and he had lost his chance. But Fate had him firmly in her keeping. His hour was not yet come. The leaders of the Revolution knew him not as yet. They were not aware that their master, obscure and unknown to anybody but himself, was watching as the Revolutionary pot began to boil that day. But there he stood, the genius of his century, unrecognized and unknown.

We are aware that many profound thinkers maintain that genius is "ever a secret to itself," but with the example of Napoleon before us it is difficult to accept that doctrine. But geniuses generally are unrecognized by the world. "Tailor-made men" and "stump orators" are unable to discern genius, and there are too many of them in the high places of this world. Fortunately the eternal laws provide their own remedy. With shams at the helm the ship of state soon gets among the breakers, and the resulting war either musters out the shams, or ends the agony in national destruction. There is nothing north of Tophet so detestable as government by shams.

On the thesis, "Genius is ever a secret to itself," arguments of any desired length might be written on either the affirmative or negative side, and history would furnish plenty of suitable examples. We shall not waste time, therefore, on the subject. Neither shall we attempt any close classification of geniuses. As already said, custom has restricted the use of the word to men who are led by a spirit of wisdom—God-inspired men. We must not forget, however, that there are devil-inspired men, and according to Scripture and experience they are in the majority. They are the unenlightened subjects of the Prince of Darkness, and therefore blind to everything divine. Geniuses, therefore, are invisible to the majority of men; and the ques-

tion, How are they to be discovered and brought to the front? becomes a serious one for a nation in difficulty.

How are they to be discovered? No one but a genius could answer that question, and he would be laughed at. Indeed, there is no practical way. But, when the time is come, the man and the emergency always get together in some way, unless the nation's iniquity deserves destruction. The hand of Providence is in it. Who would have looked in an Illinois tanyard for the General-in-chief of over a million of men? Yet he was there; and he found his way, guided by no human hand, to the proud position which he was so well qualified to fill.

And it will always be so. Nations cannot recognize military geniuses. They cannot keep an assortment of them on hand. They can only hope that Providence will provide the man. And he will, if the nation deserves it. But if the nation has transgressed the laws of nature, if it has disregarded the Eternal Laws of right and wrong, it will have to take its punishment. No military genius, no deliverer, will appear until the broken laws are satisfied. Nations have no hereafter. Their sins are punished here. Nothing is forgotten and nothing is forgiven, for the Eternal Laws avenge themselves.

A military genius is the most precious possession of a nation, and the most difficult to recognize. He cannot be created by human means. No nation can put a spirit of discernment into the souls of its commanders, nor even recognize it where it already exists. But it can train them in the technicalities of their trade and at least make kriegsspielers of them. There may be a genius among them, and such training is necessary to his full professional equipment. The remainder can be utilized for what they are worth. An army needs but one genius of the first class. Subordinate geniuses, however, are needed in every grade of the military hierarchy. Captains who can hold their men steadily to their work under a galling and even a deadly fire are geniuses. The spirits within them are master spirits whom the men instinctively recognize and obey. The leader of a forlorn hope should be such a man. If he is not, no matter how courageous he may be, his men will not follow him. In such emergencies nothing but commanding spirits can command. Men recognize such leaders instinctively. Something

akin to hypnotism compels them to feel as their leader feels; and they cannot help but follow him. There is a heap of difference between such a leader and a brave man who merely repeats the language of the drill-book. The one is a genius; the other is a kriegsspieler.

But we must not attempt any classification of geniuses. Such an undertaking would lead us beyond the limits of a magazine article. If we have been able to give the reader some idea of geniuses and genii, and the character and extent of their co-operation; if we have thrown any light on the great characteristic of genius, namely, spiritual visions, or what are generally called Revelations, and their interpretation or reproduction for the edification or correction of men, we shall have accomplished our purpose.

* * *

In reading over what we have written, the assertion "That a genius without professional skill might be a failure," seems to need some explanation or illustration. The assertion seems equivalent to saying that even with a correct diagnosis, an unskilful genius might fail in his prognosis and consequent action. And that is exactly what we mean. The prognosis depends on two elements—the diagnosis and the professional plan. If either of these be erroneous the prognosis and consequent action must be wrong. The plan of an inexperienced and unskilful commander is apt to be wrong, even if he is a genius and his diagnosis is correct. Parts of it may be unexecutable in the available time; movements intended to be secret may be discoverable by the enemy; movements intended for his eye may be overlooked; important movements of the adversary, like those of Frederick the Great at Rosbach, may be unobserved. These and others might be added, all of them due directly or indirectly to lack of experience or professional skill, might, not to say must, produce failure even with a genius in command. And the chances that they would do so would be increased a hundred fold if the adversary was also a genius.

Perhaps the best example in history of a genius who failed for want of professional skill, may be found in William of Orange, afterwards William III. of England. He had a hard bringing up, was practically a prisoner during his boyhood, had

no military training, and had never systematically studied the art of war. But he was a genius; and while yet a mere boy found himself commanding an army in the field against the most skilful general in Europe.

William was too much of a genius to be ignorant of his own deficiencies. His great regret was that he had not had the privilege of serving under Condé for a campaign or two, before being called upon to command against him. Of the two commanders William was undoubtedly the greater genius; but Condé's skill was immensely superior, and turned the scale against William in every engagement. William's genius however asserted itself even in defeat. As Macaulay says "Before his enemies had sung the *Te Deum* he was again ready for conflict." His diagnosis of defeat was a new Revelation. Such a man would not remain unskilful for any length of time.

That professional skill without genius cannot be relied on for victory, follows the foregoing as a corollary. Such a commander is bound to be wrong in his diagnosis. He cannot discern his adversary's intentions, hopes and fears, or form any accurate estimate of his army. He misreads the meaning of the data before him. His mind is enveloped in a spiritual fog through which simple facts assume monstrous proportions.

Not being able to diagnose his adversary's intentions, he fears attack at every point, and feels the necessity of being prepared to meet it everywhere. His plans will, therefore, call for three or four times the number of troops in his adversary's army. The result is extravagant demands on his government, or the tactics of retreat. Such a commander is bound to be a failure. Our War of the Rebellion can furnish some excellent examples of this kind of commander.

In studying the career of military geniuses, one is always conscious of a desire to keep behind the scenes, and get a glimpse of their mental methods. But such desires can never be gratified. The reticence of the geniuses closes every cranny of observation. None of them has ever described the mental processes by which he reached his brilliant conclusions. We have to go to military writers like Jomini or Hamley for that—or what they take to be that. To be sure their reasonings seem sound and the conclusions reached true; but we strongly sus-

pect that the geniuses themselves, if they had lived to read these productions, would have been surprised and edified. Such keen and close reasoning had no place in the preparation of their plans that they were conscious of. The "Vision of Facts" which was the foundation of their action, formed itself in their minds as they reviewed the data in their possession, without any mental effort on their part. Then this "Vision of Facts" projected on the mental picture of the adversary's mind already diagnosed, disclosed his intentions, hopes and fears clear and distinct as the picture in a camera, but, again, without mental effort on the part of the genius. These Revelations—The Vision of Facts, and The Picture of the Adversary's Intentions, Hopes and Fears—guided and governed the genius in the professional preparation of his plan. The subsidiary pictures which disclose the consequences of certain moves whether by the genius or his adversary, flash themselves into the mind of the genius exactly as the others do. So, the whole creation, though rigidly rational at every point, is in no way a child of Reason.

Military successes are of two kinds. One results from defeating, the other from conquering an enemy. Those may be obtained by kriegsspielers; these can be obtained only by geniuses. History may record both as victories, but only one deserves the name. To defeat and to conquer are not synonymous terms. In the first case the contest is postponed on compulsion; in the second there is a settlement of the dispute. A defeated enemy remains an enemy; a conquered one becomes a friend. And this is true for individuals and nations as well as armies, and among lower animals as well as men. Why there should be such a difference in the results of two physical victories apparently complete, is a psychological question which prudence forbids me to tackle.

TRANSPORTATION OF TROOPS BY SEA.

BY CAPTAIN W. E. BIRKHIMER, 3D U. S. ARTILLERY.

THE sending of several expeditions to the Philippine Islands recently has attracted attention in a manner hitherto unknown in the army of the United States to the difficulties inseparable from such undertakings. It is greatly to be desired that the experiences thereby resulting may not be lost, but placed in such tangible form as hereafter to prove valuable to those embarking on similar enterprises.

It is with particular reference to the incidents attending the outward trip of the good ship *Ohio* that this article is penned. It was one of the fleet of five vessels constituting the third expedition to those distant parts of the globe. The troops, consisting of one battalion of Wyoming volunteers, one of the 18th Infantry with headquarters staff and band, and one of the 3d Artillery, marched on board the 26th of June, 1898, at San Francisco, California, and the next day the fleet steamed out the Golden Gate. The *Ohio* arrived at Honolulu on July 5th, left that place July 9th, and arrived at Manila bay in company with the other vessels of the fleet on the afternoon of July 31st, 1898. The distance travelled by sea was in round numbers 7000 miles, not so great as from Plymouth to Calcutta by Cape of Good Hope, yet, because of the longer uninterrupted journey in the tropics involved, even more trying than the latter upon the troops.

The gross tonnage of the *Ohio* was 3392 tons; net, 2072 tons; the military on board aggregated 946, total number of souls on board, 1033: thus, counting the military alone, the net tonnage per man was 2.19, and, including the ship's crew, 2.00 tons per man. In the British transport service the tonnage (net) allowed per man is about the same; but, as in ours, this allowance varies with circumstances.

The British service has a few transport-ships, expressly constructed to carry troops, their impedimenta and even their families; yet, in any distant expedition of magnitude, like that of 1882 to Egypt, the British, like ourselves recently, have recourse to ordinary vessels of commerce for this purpose. But

there is this difference in the two cases; the British marine is so extensive that sufficient vessels for transporting any desired number of troops are always at the wharves; we must collect them in a slow, laborious manner from uncertain and precarious sources.

What precedes has relation to the general theory of transportation by sea. It is when we enter upon the particulars of the voyage that difficulties are encountered which it appears experience alone is capable of making us aware of.

Yet in some respects, it is not perceived why suffering, confusion and privation should be necessary in order that duties of a preliminary nature, tending to establish regularity and an orderly administration of affairs on ship-board, at embarkation and debarkation, should be properly understood and attended to. Take for instance the quartermaster's department—the naval chord of the military system. Nothing is plainer than this fact: in loading a vessel it is important to have everything conducted in a systematic, pre-arranged, and orderly manner, so that everything will have an ascertained place and be placed just there. Without this, all is inextricable confusion. With it there is no room for disorder; and, in fact, with a competent, industrious and painstaking quartermaster, confusion would be impossible. This point cannot be too strongly insisted upon. Active service tests the officer. And if a quartermaster is not willing to devote the time and care upon the placing stores in the ship, which the good of the service demands, he should be compelled instantaneously to give way to some one who will do it. A quartermaster should be appointed to every ship. All who are to embark should be informed beforehand what stores or supplies they will be permitted to ship, how these are to be classified, how they must be marked, and then it should be the quartermaster's business to see that these orders are carried out and everything arranged in its proper place. In this, and in this way only, can the intolerable burden be avoided during the voyage of having to turn everything topsy-turvy to get at supplies or necessary articles required en route. And had this rule been followed in the case under consideration, troops would not have been compelled, as they were, to go into battle without their reserve of ammunition and their appropriate waist-belts

which the Ordnance Department had promised to place on board, but which, owing to the confusion in supplies on ship-board, it was not known when the ship reached her destination whether they had placed there or not. There was not, perhaps, in the military community on board the ship, one person who did not, at various times during the voyage, have reason to regret the want of well established order in loading the supplies intended for his convenience or necessities.

The matter of feeding the troops was one of even greater importance. Here the pre-arranged plan broke down absolutely and quickly. The vessel agreed to furnish the cooks, to cook the rations, and all the organizations were supposed to do was to step up at meal-time, receive their well-filled mess pans, eat in contentment, and be extremely happy. It took just one so-styled meal to dispel the illusion. At the end of the second day out, when the men were beginning to recover from their sea-sickness, they were experiencing feelings akin to those characteristic of starvation. In undertaking to feed the men the ship's company had reasoned from false premises: First, that army cooks could not, because of the intense heat, remain in the kitchen to prepare the food; second, because the ship had fed several hundred steerage passengers, therefore it could with equal facility feed the same number of soldiers. The first was exploded when men selected from the army cooks on board were soon installed, as will hereafter more fully appear, in charge of the kitchen with the ship's men in the capacity of helpers; the second premise was faulty because it essayed to place soldiers, with certain rights as to food, guaranteed by the Government, and which their officers were bound to see they enjoyed, upon a plane of equality with helpless emigrants or other steerage passengers, who were compelled to be satisfied with what the ship was pleased to give them in the article of food. The ship's officers soon found that it was an altogether different contract to feed 1000 soldiers and to feed that many steerage passengers. The immediate result was that the whole management of the cooking establishment, in so far as this concerned the soldiers, was taken control of by the military authorities, and the ship's people, in so far as they had anything to do with it, played a wholly subordinate part.

But cooking the food, although a matter second in impor-

tance to none other, is not all of the commissariat on board a troop-ship. It is the common error of the inexperienced to think otherwise, and to wholly ignore that system of agencies by which the food, after being cooked, is placed on the platters of the men, and also which, preceding the cooking, assorts the supplies out of the store-house, and renders them available for the cooks to take hold of and make up into food. This whole matter was taken out of the hands of the inexperienced and placed in those of a capable Regular officer, who selected competent sergeants to assist him; distributed all coffee-pots, buckets, pans, etc., among the various companies according to their strength; marked all these vessels indelibly so they could not be appropriated by others, assigned the non-commissioned officers their places and duties in the gangways, gave them the necessary privates as helpers in handling the cooked food, established and enforced the order of precedence in which the various organizations should be fed. Not only did he thus organize his commissariat, but he saw to it that his orders and rules were observed and enforced. As a result, order was upon the instant, as it were, brought out of preëxisting chaos. The men at once began to receive their food regularly, to the full extent of the ration, and with all the convenience that the crowded condition of the ship permitted. From this time until the end of the voyage there was no well-grounded cause for complaint in this regard, except in one particular: The bakery could not, nor did it ever, make good bread. Why this was so no one seemed exactly to understand; and, after a board of officers had investigated the matter, the official opinion seemed to be that the difficulty was inherent in the bakery and could not be remedied. Most of the men gained weight on the journey, tropical though this was.

One fact in connection with food service soon forced itself upon the attention of officers who witnessed the distribution of food to the men. It was soon observed how they craved something sweet. The commissary department had placed on board what it deemed an ample supply of delicacies, but although sold for cash only it was swept up as the conflagration licks up the puny stream thrown upon it. Three times the supply sent out would not have met the demand. And right

here let it be suggested to the department that if it could add to the ration of troops going on long voyages an unusual supply of tomatoes, potatoes, and above all add a liberal supply of sweets, as, for instance, syrups, the comfort of the men would thereby be greatly enhanced. Let not the mistake be made of supposing that this would be catering too much to a vitiated soldier's taste; it is by no means so: this is a matter of real, substantial importance. The officers had the same experience: before the journey was half over the food placed before them at the cabin table palled on the palate, tasted as if it had all been prepared in one dish, and sweets and fruit were welcomed as a most delightful variation to the bill of fare.

The officers were boarded at the cabin table for \$1.50 per day, which also covered state-room service, baths, etc., incident to first-class passage. It doubtless was the consensus of opinion that this sum was ample remuneration for the return received. But on the other hand, in judging here, the extraordinary length of the journey, and the fact that it lay almost wholly within the equatorial belt should not be forgotten; the former naturally ran the supplies low, and the latter rendered it difficult to keep the food fresh.

Not until the journey was half accomplished did the matter of fresh water supply on board begin to attract attention. At first all had as much as they wished. In mid-ocean, and where the length and heat of the voyage were making themselves adversely felt in the tempers and nerves of all on board, the ship's company took occasion to foment a panic because of the supposed extravagant waste and consequent running short of the fresh water. There never was a more baseless charge, and investigation showed that, while this water was limited in amount, yet that it had been carefully and sparingly dealt out; and what was of more importance, the ship possessed facilities for condensing daily 2000 gallons as it claimed, and 1300 gallons in fact, so that it made no essential difference whether the fresh water gave out or not so long as the condensing apparatus worked. Yet this worked-up hysteria on the part of the ship's company served to develop the fact that when we started from San Francisco they had no precise but only the most vague idea of how much fresh water the ship carried, and afterwards

an even hazier idea as to how it was being consumed. It seems reasonable to expect that some department of the military service should see to this matter of water-supply, and have precise knowledge regarding all parts of it, not through the perhaps slothful and ignorant senses of the ship's company, but the personal observation of the military officer whose business it is made to look after such matters.

In the storage of fresh meat the experience of the ship's company is very valuable, and affords lessons that the military may well heed. When this meat is to be carried into the tropics, they store it at night, soon after being killed, and with every possible care to eliminate blood as much as possible and to prevent the meat being bruised while being placed in cold-storage rooms. The result is that the ship's fresh meat carries perfectly on the longest and severest journey, while that stored with less care is apt to be thrown away, spoiled by the thousands of pounds; a circumstance that is said to have occurred during the third Philippine expedition.

The police of the ship attracted early, earnest and unabating attention. During the first twenty-four hours out a storm of considerable severity prostrated nearly all on board with that terrible affection sea-sickness, and at the end of two days it was evident that energetic and heroic measures must be taken to cleanse the ship and keep it purified. This involved scrubbing all floors, and flushing where possible; cleansing and keeping clean all water closets; compelling the men to place and keep their rooms and bunks in order; replenishing the water-coolers and regulating the amount of water taken from them by individuals. A police-officer was appointed with authority commensurate with his important duties. All company officers were required personally to supervise the portion of the ship occupied by their commands, but, in addition, the police officer had full authority to adopt such measures as he saw fit to preserve cleanliness, while both he and the medical officers were required to inspect daily and make report upon any case warranting it. The water closets and water coolers were placed under charge of sentinels, to see that orders regarding them were carried out. The keeping the closets clean and pure being a favorite duty placed upon guard-house offenders, they were re-

quired to wash them out many times every day. Deodorizers were also abundantly used in this connection. In this way, all working together, the police of the vessel was very successfully maintained after the system got into working order, which was very soon. Had it not been for this a pestilence would have been developed in short order. But it took unceasing vigilance to maintain, as well as a discriminating, methodical mind to organize the sanitary system. It was, however, indispensable ; and to it was due the general good health and spirits of the command, maintained throughout the voyage.

In this connection, it may be pointed out that, in the transportation of troops by sea, an occasion arises when company commanders can test the stuff their non-commissioned officers are made of, and also utilize their services to the utmost. Any dullard almost, or any brilliant and impracticable theorist, can get along in ordinary garrison duty. It is when adverse circumstances surround them, and they are passing through the ordeal of military exigencies, such as are at once developed when a command starts on a long sea voyage, that the real soldier comes to the front, and the really worthless characters, high or low, sink in obscurity out of sight. How often on that long and trying journey was this fact present to the minds of every company commander ! The company commander first of all should know and remember where on shipboard every man of his command is located. He should keep before him a list and diagram showing this. He should then give every non-commissioned officer something to do in maintaining order and administering to the comfort of the men. The latter should be organized into squads, one or more non-commissioned officers assigned to the supervision of each, and held to strict accountability, that order, cleanliness, and punctuality characterize their respective commands. In this way the captain will have his burdens lightened ; the non-commissioned officers will have legitimate occupation, while cleanliness and decorum will more generally prevail. In this connection it is of primary importance to the personal comfort of the men, that they should, before going on ship, mark distinctly, and so it will be easily recognizable, every article of their property. If they have not done this before, the necessity soon becomes apparent after getting

on board. Then the disposition to appropriate what does not belong to them is very great to some men, and the practice conforms thereto. Having the articles clearly and unmistakably marked acts as a deterrent to such people, and facilitates their return to their owners. Men may neglect this during their first voyage, but are not apt to when preparing for a second one.

On a tropical journey, nothing is more appreciated by the troops, perhaps, than abundant bathing facilities, and here the shower has many points of advantage over the tub-bath. It is cleaner; the water comes with a grateful shock that is most invigorating. The men greatly prefer it. The quartermaster's department had endeavored to provide bathing facilities abundant for all, and military orders required the men to bathe daily. It were well, in the tropics, if this were done twice daily, morning and at night, just before retiring. The shower bathing-apparatus seemed, however, crudely and hastily built, and was constantly getting out of order. Then, again, there seemed to be constant friction between the engineer who shut off or turned on the water-supply, so that almost every morning there was great trouble in getting enough water to take advantage of the showers during the assigned hours. How much of this trouble could have been obviated under a more vigilant system of administration, it is not possible to tell. It is believed, however, that with proper military supervision, the engineer could speedily have been brought to terms.

A circumstance which almost of necessity militated against the comfort of the men was, first, that commercial vessels had hastily to be converted into troop-ships; second, that owing to the need of quickly getting the soldiers to the Philippines in large numbers, these vessels were much crowded. No one was to blame for this. The military situation demanded it. But in fitting up the ships, the question frequently arose during the voyage, whether they could not have been more comfortably arranged, and the belief was expressed that they might have been. On such occasions it is of first importance to have the freest possible circulation of air throughout all parts of the ship. On the *Ohio*, on the contrary, the almost innumerable partitions, dividing the space below into small state-rooms, largely obstructed circulation of the air. The question is, could not

these partitions have been knocked out, and thereby a far better circulation of air be secured, with accommodations, perhaps, for a larger number of men. But certainly the circulation of fresh air would thereby have been much improved.

One of the greatest difficulties on such voyages as the *Ohio* recently made is in giving officers and men sufficient exercise to keep them in good health. It is different in the Regular navy, where life on ship-board is reduced to a science, and every resource availed of to render life varied and healthful. The landsmen labor under disadvantages here when compared with their naval associates. In the particular instance under consideration the heat influenced all measures taken for exercise or instruction. In truth it may be said that the struggle for physical existence is so great that no mental effort, except it be indulged as a relaxation, should be required or permitted. With reference, however, to physical exercise, the case is altogether different. It is believed that walking, the calisthenic exercises, the manual of arms, and other similar expedients can be resorted to, and should be, both by officers and men, to keep the blood in healthy circulation. All will feel the better for such a degree of physical exercise as will keep the pores of the skin open, instead of simply eating, drinking, sitting on deck or sleeping.

Every officer should provide himself with and take on deck a reclining chair. He will have constant occasion to use it, and unless he provide his own, will be using that of another, with the feeling, intolerable to a gentleman, that, without contributing his fair share towards the community property, he is, perhaps to their inconvenience, appropriating the property of others.

To sum up, it may be said with reference to this voyage of the steamship *Ohio*, that it was successful, but this was because the military authorities, exercising their legitimate power, took the management of affairs, in so far as the soldiers were concerned, into their own hands, and, by regulating by military methods, the commissary department, the policing of the ship and the bathing of the men, secured to the troops the full use of their ration, healthful surroundings and cleanliness of persons. The baleful effects of the fundamental error of not assorting, arranging, and systematically storing the property are even yet felt, and never can wholly be recovered from.

MANILA, PHILIPPINE ISLANDS, August 21, 1898.

Reprints and Translations.

VON LÖBELL'S ANNUAL REPORTS ON THE CHANGES AND PROGRESS IN MILITARY MAT- TERS DURING 1897.

PRÉCIS BY MAJOR-GENERAL H. J. T. HILDYARD, C. B., COMMANDING 3D
INFANTRY BRIGADE, ALDERSHOT.

(From *The Journal of the Royal United Service Institution.*)

THIS publication marks the twenty-fourth issue of these yearly summaries of all that is of import or interest in the military matters throughout the world. Whenever a rupture occurs between two Powers which results in war, whether it be between nations such as Greece and Turkey, as in 1897, or between the United States of America and Spain, as in the current year, it is to the pages of Von Löbell's reports that reference is made for trustworthy information regarding the armed forces that it will be in the power of each combatant to place and maintain in the field.

This year, in addition to the exhaustive information recorded, which has reference to European States, there are reports on the military capabilities of the United States of America, Mexico, the Transvaal, and the Orange Free State, and also a slight complement to the preceding year's report on Afghanistan.

In next year's issue it is intended to present a retrospect of the changes that have taken place in army matters in the several States since the first appearance of this publication.

H. H.

REPORTS ON THE ARMED FORCES OF INDIVIDUAL STATES.

GERMANY.

Peace Strength :—

Arms.	Officers.	Other Ranks.	Troop and Draught Horses.	Horsed Guns.	Horsed Ammunition Wagons.
Infantry.....	12,208	357,000	—	—	—
Cavalry.....	2,356	64,496	63,928	—	—
Field Artillery.....	2,524	56,491	28,593	2542	91
Foot Artillery.....	810	21,650	—	—	—
Pioneers and Railway Troops.....	738	18,882	—	—	—
Train.....	308	7,560	4,250	—	—
Total	18,944	526,079	96,771	2542	91

Only trained men are included in the numbers contained in this table.

The peace strength of the several units is the following :

Infantry :

	Officers.	Men.
86 battalions of regiments on the lower establishment	18	501
428 battalions of regiments on the medium establishment	18	573
93 battalions of regiments on the higher establishment	22	639
15 Jäger battalions on the lower establishment	22	614
4 Jäger battalions on the higher establishment	22	679

Cavalry :

	Officers.	Men.	Horses.
170 squadrons of regiments on the lower establishment	4	133	133
235 squadrons of regiments on the medium establishment	4	138	137
60 squadrons of regiments on the higher establishment	4	146	140

Field Artillery :

	Officers.	Men.	Horses.	Horsed Guns.
188 field batteries on the lower establishment	4	108	44	4
235 field batteries on the medium establishment	4	119	60	6
24 field batteries on the higher establishment	4	127	75	6 and 2 horsed ammunition wagons.
23 horse artillery batteries on the lower establishment	4	91	76	4
4 horse artillery batteries on the medium establishment	4	112	105	6
20 horse artillery batteries on the higher establishment	4	120	120	6 and 2 horsed ammunition wagons.

Particulars regarding the war strength of units are not published.

Organization.—The reorganization of the army designed to take effect from the 1st April, 1897, has been carried out as planned. The whole of the new bodies of troops to be formed under the law of the 28th June, 1896, had in the course of the exercise year of 1897 the opportunity of proving their fitness for service in the same manner as the previously formed bodies. The arrangements for their quartering and establishment in the new garrisons have been finally settled.

The following are some of the more important items of increase in the establishments for 1897-98:

OFFICERS.

Prussia and the contingents administered by her:

Infantry.—16 brigade commanders, 33 regimental commanders, 244 second lieutenants, 33 superior surgeons, 33 surgeons.

Against this increase, there was a reduction of 67 battalion commanders, 2 captains (1st class), 2 first lieutenants, and 60 assistant surgeons.

Cavalry.—5 captains (1st class), 5 first lieutenants, 15 second lieutenants for the detachment of mounted Jägers.

Transport detachments for horsing foot artillery have been newly formed at Glogau and at Thorn respectively, and have been attached to the 6th and 17th train battalions, which have each received an augmentation of a first lieutenant.

In Bavaria there has been the following increase in the number of officers:

Infantry.—2 brigade commanders, 2 regimental commanders, 2 field officers, 36 second lieutenants, 4 superior surgeons, and 6 surgeons.

There has been a reduction of 10 battalion commanders and 10 assistant surgeons.

Cavalry.—1 captain (1st class), 1 first lieutenant, 3 second lieutenants.

The existing half detachment for horsing foot artillery has been increased to a complete detachment.

In Saxony there has been an increase to the infantry of 1 brigade commander, 3 regimental commanders, 22 second lieutenants, 3 superior surgeons, and 3 surgeons. There has been a corresponding decrease of 6 battalion commanders and 6 assistant surgeons.

In Wurtemberg the increase has been 2 regimental commanders, 14 second lieutenants, 2 superior surgeons, and 2 surgeons.

Formations.—Further progress has been made with the formation of the "mounted Jäger detachments," which is to be the designation henceforth of the "Meldereiter detachments."

There are now six of these, belonging respectively to the Guard Corps, the 1st, 14th, 15th, 17th, and 2d Bavarian Army Corps. Each of them is attached to a regiment of cavalry, and is of the strength of a squadron of the regiment to which it is attached. The personnel and horses are included in the establishment of the regiment concerned.

DISTRIBUTION OF THE NEWLY-FORMED TROOPS.

Prussia.

5th Guard Infantry Brigade Staff, 5th Foot Guards Regiment, and 5th Grenadier Guards Regiment, Spandau.

73d Infantry Brigade Staff and 146th Regiment, Königsberg; 147th Regiment, Insterburg.

74th Infantry Brigade Staff and 148th Regiment, Stettin; 149th Regiment, Schneidmühl.

75th Infantry Brigade Staff and 1st Battalion, 150th Regiment, Frankfurt a. d. O.; 2d Battalion, Cüstrin; Staff and 1st Battalion 151st Regiment, Wittenberg; 2d Battalion, Neu-Duppin.

76th Infantry Brigade Staff and 1st Battalion 152d Regiment, Magdeburg; 2d Battalion, Zerbst; 153d Regiment, Altenburg.

77th Infantry Brigade Staff and 155th Regiment, Ostrovo; 154th Regiment, Jauer.

78th Infantry Brigade Staff and 156th and 157th Regiments, Brieg.

79th Infantry Brigade Staff and 158th Regiment, Paderborn; 159th Regiment, Mühlheim a. d. Ruhr.

8th Infantry Brigade Staff and 161st Regiment, Trier; Staff and 2d Battalion 160th Regiment, Bonn; 1st Battalion, Diez.

81st Infantry Brigade Staff and 162d Regiment, Lübeck; 163d Regiment, Neumünster.

82d Infantry Brigade Staff, Hanover; 164th Regiment, Hameln; Staff and 1st Battalion 165th Regiment, Goslar; 2d Battalion, Brandenburg a. H.

83d Infantry Brigade Staff and 166th Regiment, Hanau, 167th Regiment, Cassel.

84th Infantry Brigade Staff, Carlsruhe; 169th Regiment, Lahr; 170th Regiment, Offenburg.

85th Infantry Brigade Staff and 172d Regiment, Strasburg i. E.; 171st Regiment, Bitsch.

86th Infantry Brigade Staff and 174th Regiment, Metz; 173d Regiment, St. Avold.

87th Infantry Brigade Staff and 175th and 176th Regiments, Thorn.

Bavaria.

20th Infantry Regiment, Staff and 1st Battalion, Lindau; 2d Battalion, Kempten; 3d Battalion, Landsberg.

21st Infantry Regiment Staff, and 1st Battalion, Fürth; 2d Battalion, Zulzbach; 3d Battalion, Eichstädt.

22d Infantry Regiment, Zweibrücken.

23d Infantry Regiment, Landau; 2d Battalion, Saargemünd.

9th Infantry Brigade, Landau.

10th Infantry Brigade, Metz.

11th Infantry Brigade, Neu-Ulm.

12th Infantry Brigade, Zweibrücken.

Saxony.

88th Infantry Brigade Staff and 177th Regiment, Dresden; 2d Battalion, Königstein; 178th Regiment, Kamenz; 2d Battalion, Zittau; 179th Regiment, Leipzig; 2d Battalion, Leisnig.

Wurtemberg.

127th Infantry Regiment, Ulm; 180th Infantry Regiment, Tübingen; 2d Battalion, Gmünd.

Consequent upon the conversion of the 4th battalions there were necessarily considerable modifications in the distribution of the previously existing formations.

Recruiting.—The total number of men liable to be taken for service including both the alphabetical lists of those becoming liable for the first time and the lists of those postponed in previous years was, in 1896, 1,575,488 men. This is an increase of 34,500 men on the number for the preceding year.

The distribution of the total available was as follows:—

Unaccounted for	51,022 men
Failed to appear	111,727 "
Become liable to service in previous years . .	383,287 "
Postponed	546,759 "
Excluded	1,267 "
Rejected	38,191 "
Allotted to the Landwehr (1st levy)	104,950 "
" " Ersatz reserve.	82,610 "
" " Naval Ersatz reserve	910 "
* Enrolled	123,669 "
In excess of requirements	9,823 "
Enlisted voluntarily in the Army.	20,507 "
" " " Navy.	726 "

* 1,575,448 men

BELGIUM.

The long deferred reorganization of the army, on the basis of obligatory personal service, has not as yet been effected.

In peace, as well as in war, the existing organization provides for the formation of only 4 army divisions and 2 cavalry divisions, besides fortress troops.

In peace the infantry divisions, which have their headquarters at Ghent, Antwerp, Liège, and Brussels respectively, are composed each of 2 brigades. (The 3d division has 3 brigades.)

The 7 brigades, forming part of the 1st, 2d, and 3d divisions, consist each of 2 line regiments, with 6 active and 4 reserve battalions.

The 2 brigades of the 4th division are composed 1 of 2 regiments of rifles, with 6 active and 4 reserve battalions; the other of 1 regiment each of rifles, grenadiers, and carabiniers, with together 10 active and 7 reserve battalions.

The two cavalry divisions are located at Brussels and Ghent respectively; the 1st division has 1 brigade detached to Namur, and the 2d

* These numbers are as given in Von Löbell (p. 12); but there appears to be an error somewhere of 100,000 men. The number enrolled in 1895 was 227,212 men, and for 1896 should probably be 223,669 instead of the number noted above.

division has 1 at Mons. Each division has 2 brigades of 2 regiments, forming together 10 active and 2 depot squadrons.

There are 2 brigades, the 1st and 2d, of field artillery, each of 2 regiments of 3 divisions, located at Ghent and Brussels respectively. The 2d and 4th regiments have in addition 1 horse artillery battery.

The 1st and 3d regiments consist each of 8 active, 2 reserve, and 1 depot batteries; the 2d and 4th regiments have 7 active, 3 reserve, and 1 depot field batteries, and 2 horse artillery batteries.

There are also 2 brigades, the 3d and 4th, of fortress artillery, each composed of 2 regiments. Each regiment is formed of 14 active, 2 reserve batteries, and 1 depot battery.

The engineer services are provided for by a regiment at Antwerp, composed of 3 active and 1 reserve battalions; of these, the staff and 2 companies of the 3d battalion are at Liège and 2 companies at Namur.

There are further 7 companies and a depot company of train, of which the headquarters are at Antwerp; the 3d company is at the Beverloo camp, the 4th at Brussels, and the 7th at Brussels and Liège.

There are besides 4 companies of artillery and 5 of engineers for technical services.

On mobilization 4 army divisions are formed, each consisting of 4 regiments of 12 battalions and a carabinier battalion; 2 squadrons, 8 field batteries (the 2d and 3d have only 7), 1 company of engineers and 1 train company, besides 4 ammunition columns, 2 supply columns, and auxiliary services.

The infantry has then to be expanded from its existing strength of 27,738 men by the addition of some 80,455 men drawn from 13 classes of the reserve; the cavalry receives 3,463 men, the artillery 18,035 men, and other arms and branches of the service in like proportion. In all a strength of about 3515 officers and 140,000 men is anticipated.

If the several units be compared in a similar manner, it seems that the active battalion of the line will have 409 men on a peace establishment, whereas its war strength is 1006 men. The reserve battalions having in peace a weak cadre of 27 men, will have to be increased to 806 men.

The active squadron has in peace 140 men and 130 horses; in war it has 160 men and 170 horses.

The artillery are even more unfavorably situated. The horse battery has in peace 114 men and 107 horses; in war 180 men and 216 horses. The field battery has in peace 92 men and 61 horses; in war 166 men and 154 horses. The reserve field battery, with a cadre in peace of 18 men and 31 horses, has in war the same establishment as the active field battery. The active battery of fortress artillery has 68 men; for war it is raised to an establishment of 183 men.

FRANCE.

The total peace establishment of the army for 1897 was fixed at 29,-

000 officers and 573,720 other ranks; the actual net strength was 28,066 officers and 529,800 men. In these numbers are included, however, 732 officers and 24,869 men of the Gendarmerie and Republican Guard.

The estimates for 1898 were framed to provide for an increase of 151 officers and 12,542 men.

The most material changes effected during 1897 were the formation, in accordance with the law of the 4th of March, of 4th battalions in the 145 subdivisional infantry regiments, and the adoption of a new system for the field artillery.

The creation of the 145 new battalions that has been authorized is to be proceeded with gradually, according to the means and recruits available.

This new formation of the French infantry is a very material increase to the armed forces that will be made available in the first line; and it has this further advantage, that the new formations to be formed from the cadres complémentaires will no longer have to be improvised upon mobilization. A period of some years will be required before this measure is completed; but when it is, France will have at her disposal 145 more active peace battalions than she has now, which represents the infantry for six army corps.

The new battalions are to have an establishment of:

- 1 battalion commander.
- 1 captain-adjutant major.
- 4 captains.
- 8 lieutenants or sub-lieutenants.
- 4 adjutants.
- 4 sergeant-majors.
- 16 sergeants.
- 4 clerks.
- 32 corporals.

The number of privates has not been indicated.

According to the French military press, the formation of most of the 4th battalions of the regiments of the 6th and 15th Corps was carried out in the autumn of 1897. In each case from 2 to 4 companies were formed, each with a strength of 3 officers, 11 non-commissioned officers, and 100 men. During 1898 the formations of the 4th battalions in the 1st and 7th Corps is to be effected.

When the measure has been carried out in all the army corps, the French infantry will have an increased peace establishment of about 50,000 men. The necessary number of recruits is available, for in the autumn of 1897 the number enrolled exceeded by 20,000 that of the preceding year.

It seems probable that eventually these new battalions may be utilized for the formation of larger bodies of troops.

The distribution of the battalions has only been fixed in the following instances:

15th Army Corps Region :

4th Battalion	55th Regiment	Arles	} 29th Infantry Division.
"	112th "	Nice	
"	111th "	Toulon	
"	141st "	Marseilles	
"	40th "	Nimes	} 30th Infantry Division.
"	3d "	Pont St. Esprit	
"	61st "	Marseilles	
"	58th "	Uzès	
"	163d "	The Island of Corsica.	

6th Army Corps Region :

4th Battalion	94th Regiment	Verdun	} 12th Infantry Division.
"	106th "	Verdun—formed at Châlons	
"	91st "	"	

Artillery.—By a decree of the 15th January, the 8th Regiment is to consist in future of 12 field and 2 horse batteries (an increase of 1 field battery), and the 9th Regiment of 9 field and 2 horse batteries (a decrease of 1 field battery).

At the same time 2 batteries of foot artillery were transferred from the 7th to the 16th Battalion.

On the 17th August, 4 new batteries of foot artillery were formed, and attached 1 each to the 7th and 16th Battalions, and the other 2 to the 11th Battalion.

The following battalions of foot artillery now vary from the normal establishment of 6 batteries :

The 6th Battalion has 9 batteries

7th	"	"	5	"
11th	"	"	8	"
16th	"	"	9	"

Engineers.—The formation of a 20th Engineer Battalion for the new 20th Army Corps about to be formed, and of a Military Telegraph Corps of 6 companies is imminent.

Recruiting.—In 1896 the young men of the 1895 class were called up. These numbered 331,368, being 5841 less than the preceding year. There were also men postponed in 1894—46,627—and in 1893, 22,018.

After deducting from the 1895 class those postponed and allotted to auxiliary services, there remained available 230,700 recruits for the army. Of these, 69,438 were enrolled for an active service of one year, and 161,262 for that of two to three years.

The number of recruits allotted to the infantry was 7000 more than it was in the preceding year.

In the course of the year 16,919 men joined the home army and 5595 the troops in Algeria by voluntary engagement.

In Algeria the number of young men who became available for obligatory service was 5341, of whom 3078 were enrolled.

Composition of the Army by Annual Classes.—From the 1st November, 1897, to the 31st October, 1898, there belong :

To the Active Army, the Annual Classes of 1896, 1895, and 1894.

“ Reserve of the Army “ “ 1893 to 1884.

“ Territorial Army “ “ 1883 to 1878.

“ Reserve of the Territorial Army “ 1877 to 1872.

It appears from a debate that took place in the Chamber, that in the event of mobilization the number of available horses fit for the requirements of service would be short by from 20,000 to 30,000.

It has been stated by the press that the total requirements in horses on mobilization would amount to 483,045, and the impossibility of obtaining the number of properly qualified horses required to augment the peace establishment has been pointed out.

Officers.—Since the establishment of the 15th February, 1896, there has been an increase of 289 infantry and 109 cavalry officers. There has been a reduction of 6 officers in the artillery.

Development of Strategic Lines of Railway.—A publication, entitled *Les Chemins de fer et la Mobilisation*, appeared in the summer of 1897, which contains remarkable and generally accurate information regarding the capabilities of the French railways for the purposes of mobilization and war.

This part of the national defenses has been organized with great care and technical knowledge, so that the utmost possible appears to have been done. In the period between 1881 and 1894, the increase in the total length of the available lines has been from 25,420 to 35,907 kilometres. Seven lines, double throughout and with steel rails, now lead to the eastern frontier.

The railway companies will be in a position, before the commencement of mobilization, to place 9959 engines and 293,465 carriages (these numbers will have been still further increased during the last few years) at the disposal of the Minister of War. One hundred and six trains are required for the conveyance of an army corps, 29 trains for an infantry division of the usual composition, viz.: 12 battalions, 1 squadron, 6 batteries, with trains and columns. It is laid down that for the transport of the whole of the forces to the frontier, 2014 locomotives and 64,488 wagons would be required ; so there is a very material surplus in rolling-stock beyond the amount necessary.

The writer comes finally to the conclusion, that the railways are in a position to convey by the evening of the fifth mobilization day 5,796,000 men, a number considerably greater than France could produce in the event of war.

ITALY.

There are two establishments fixed for the army in peace : the one lays down numbers of officers, men, and horses of the several arms that

may not be exceeded ; the other indicates the average strength of these arms, or, in other words, the anticipated rationed strength.

For all arms the following were the establishments for 1897-98 :

	Maximum.	Average.
Officers	13,818	13,392
Men	264,448	209,337
Officers' horses	10,123	9,796
Troop horses	38,434	36,182

In war the twelve army corps of the standing army are each composed of 2 infantry divisions of 2 brigades (with 1 bersaglieri regiment), making 9 regiments = 27 battalions infantry ; 1 regiment cavalry = 6 squadrons ; 2 regiments, each of 2 divisions field artillery = 16 batteries ; 2 companies of engineers ; 1 company for supply service ; 1 sanitary company.

The field army is formed of the standing army and the mobile militia, which consists of all arms with the exception of cavalry.

The standing army consists of 14,397 officers, 511,788 other ranks, 94,201 public horses, 1242 guns, and 16,248 horsed vehicles (including guns).

The mobile militia has 5298 officers, 207,630 other ranks, 17,073 public horses, 366 horsed guns, and 3450 horsed vehicles.

The special Sardinian militia and the territorial militia are in addition to the above.

The latest information (June, 1896) in regard to the total numbers borne on the lists of the several categories gives the following results as regards men :

	With the Colors.	On Furlough.	Total.	Percentage.
Standing Army	216,723	546,771	763,494	22.99
Mobile Militia		478,348	478,348	14.38
Territorial Militia		2,083,924	2,083,924	62.63
Total	216,723	3,109,043	3,325,766	100.00

Of the men of territorial militia, 67 per cent. (3d category) are not trained at all ; a further considerable portion (2d category) even of the mobile militia are only very little trained.

The situation is even worse as regards officers. In 1896 there were serving in the active army 14,414 officers, and there were allotted to that army 6294 ersatz officers—an increase of 258 over the previous year. For the mobile militia there were 4476 ersatz officers available, an increase of 167 over the previous year.

There were on the same date 5496 officers belonging to the territorial militia, being a decrease of 140 as compared with the previous year. There were further 6807 officers borne on the general list *à disposition*, which includes retired officers ; and, looking to the want of a proper control, it seems doubtful whether all those kept on the list are really still effective for service.

The Reorganization Law of 1897.—This law gave legal sanction to many changes that had already been effected. The following is a brief summary of its bearing upon the several portions of the armed forces.

1. *Standing Army.*—One district command has been added, making 88 in all. Ninety-eight permanent district companies have been abolished and distributed amongst the infantry. The number of remount depots has been increased from 4 to 6.

The changes that had been already effected before 1897 are the conversion of 6 field artillery batteries into a similar number of mountain batteries. The 6 batteries of field artillery now deficient are to be supplied on mobilization by the mobile militia. Further, the separation of the coast and fortress artillery in independent battalions; the formation of a 5th engineer regiment; the independence of the railway battalion, the strength of which has been increased from 4 to 6 companies.

2. *Mobile Militia.*—To consist of 51 infantry regiments of the line, 20 battalions of bersaglieri (an increase of 1), 38 Alpine companies (an increase of 16), 31 squadrons (to replace the 25 reserve squadrons previously existing), 63 field artillery batteries (an increase of 9), 15 mountain artillery batteries (an increase of six), 78 coast and fortress artillery companies (an increase of 34), 24 artillery train companies (an increase of 9), 54 engineer companies, and 4 engineer train companies. On the other hand, 13 sanitary companies and 13 supply companies are done away with, as is also the case in the territorial militia, for, in the event of war, the whole of the sanitary and supply personnel is to be allotted to the army of the first line.

3. *Territorial Militia.*—The strength of this is fixed at 324 battalions of infantry (an increase of 4), 22 Alpine battalions (75 companies), 100 fortress artillery companies, and 30 engineer companies.

The redistribution of military districts, provided for by the same law, is as follows, the first place named after the number of each division is the staff quarters of the division:

1st Army Corps (1st division): Turin, Pinerolo; (2d division): Novara, Vercelli, Ivrea.

2d Army Corps (3d division): Alessandria, Casale, Voghera, Pavia; (4th division): Cuneo, Mondovì.

3d Army Corps (5th division): Milan, Monza, Como, Lodi, Varese; (6th division): Brescia, Luco, Bergamo.

4th Army Corps (7th division): Placentia, Cremona, Parma, Reggio, Emilia; (8th division): Genoa, Savona.

5th Army Corps (9th division): Verona, Vicenza, Mantua; (10 division): Padua, Rovigo, Venice, Belluno, Treviso, Udine.

6th Army Corps (11th division): Bologna, Modena, Ferrara; (12th division): Ravenna, Farli.

7th Army Corps (13th division): Ancona, Pesaro, Maserato; (14th division): Chieti, Teramo, Ascoli Piceno, Aquila, Salmona, Campobasso, Foggia.

8th Army Corps (15th division): Florence, Arezzo, Pistoia; (16th division): Leghorn, Sienna, Lucca, Massa.

9th Army Corps (17th division): Rome, Frosinone; (18th division): Perugia, Spoleto, Orvieto; (25th division, Sardinia): Cagliari, Sassari.

10th Army Corps (19th division): Naples, Caserta, Gaëta, Benevento; (20th division): Salerno, Campagna, Avellipo, Nola.

11th Army Corps (21st division): Bari, Barletta, Lecce, Tarento, Potenza; (22d division): Catanzaro, Reggio, Calabria, Cosenza, Castrovillari.

12th Army Corps (23d division): Palermo, Girgenti, Trapani, Cefalu; (24th division): Messina, Syracuse, Sattanisetta, Catania.

Artillery.—The territorial distribution is different in the case of the artillery, the superior commands of which are grouped in eight centres in the following manner:

Place of the Artillery Command.	Army Corps.	Field Artillery Regiments.	Coast Artillery Battalions.	Fortress Artillery Battalions.	Artillery Directions.
Turin.....	1	5 & 17 Mountain Regt.	—	6 & 7	Turin.
Alessandria.	2	9, 11, & 23	—	4 & 5	Alessandria.
Placentia...	4	4, 15, & 21	10 & 11	3	Placentia, Genoa.
Verona.....	3 & 5	6, 8, 16, 20 & Horse Regt.	1	1 & 2	Mantua, Verona, Venice.
Bologna....	6 & 7	3, 7, 14, & 19	7 & 8	8	Spezzia.
Rome.....	8 & 9	1, 2, 13, & 18	2 & 9	9 & 10	Rome, Ancona, Maddalena.
Naples.....	10	10, 12, & 24	6	11	Naples.
Messina....	11 & 12	22	3, 4 & 5	—	Tarento, Messina.

Engineers.—The distribution of this arm is the following:

Engineer Command.	Army Corps.	Directions.	Sub-Directions.
Turin....	1 & 2	Turin, Alessandria, Milan	Novara, Cuneo.
Venice..	3 & 5	Verona, Venice	Brescia, Padua.
Genoa...	4	Placentia, Genoa	—
Spezzia..	6 & 8	Bologna, Florence, Spezzia	Ravenna, Leghorn.
Rome...	7 & 9	Ancona, Rome	Chieti, Perugia, Cagliari.
Naples...	10, 11, & 12	Naples, Bari, Palermo	Salerno, Catanzaro, Tarento, Messina.

Infantry Organization.—On the 1st of January, 1898, every regiment of infantry and bersaglieri had to form a depot. After the changes of garrison had been carried out in the February and March following, 22 infantry and 5 bersaglieri regiments had their depots (including the stores of clothing and arms for mobilization) away from the regiment, though most of them were in its neighborhood.

Training.—Having regard to the small proportion of men, not be-

longing to the active army, called up for training in 1896, the number was exceptionally large in 1897. More than 100,000 men underwent a course of training, the duration of which varied from fifteen to thirty days. The object of calling out so many men was not solely to freshen up their military training, but also with a view to strengthening the troops participating in the manœuvres, to forming a separate division of mobile militia for the great manœuvres, to affording a trial of the coast-defense service, and to making as many men as possible familiar with the 6.5-millimetre rifle.

The men who were trained for fifteen days belong to the territorial militia of seven districts of the 8th Army Corps and were those destined to form coast-defense companies. Those trained for twenty days and twenty-five days respectively belonged in part to men of the reserve of the standing army, part to the mobile militia and the rest to the territorial militia.

The only men up for the full period of thirty days (in some cases thirty-five days) were the non-commissioned officers in each case, and the men belonging to the reserve of the Alpine troops (1872 class).

MEXICO.

The promulgation of the law of 1897, for the organization of the armed forces, has brought into unusual prominence the military capabilities of this State.

In peace the standing army consists of the units specified below: until mobilization, formed bodies larger than battalions and regiments are not constituted: 28 battalions of infantry of 4 companies, 12 cadre battalions of infantry of 2 companies, 2 regional infantry battalions of 2 companies, 7 regional infantry companies, 1 battalion of pioneers of 4 companies, 1 battalion of invalids, 14 cavalry regiments of 4 squadrons, 8 cavalry cadre regiments of 2 squadrons, 2 regional squadrons, 1 squadron mounted police, 4 battalions of field artillery of 4 batteries, 1 battalion of machine-gun artillery of two companies, 1 park squadron, 1 train squadron.

The peace establishment is:

	Officers.	Non-com. Officers.	Men.	Horses and mules.
Infantry	1,286	3,826	16,651	1,363
Cavalry	663	1,849	5,989	9,257
Artillery	228	722	1,867	2,205
Engineers	55	150	585	234

In war the strength is:

	Officers.	Other ranks.
Infantry	1,600	32,000
Cavalry	900	8,000
Artillery	400	3,500
Engineers	100	1,000
Reserves of all arms	600	100,000
Total	3,600	144,500

To these numbers will have to be added the auxiliary forces which the several States of the federation are able to dispose of. The new organization of these is in course of preparation, and will later on be of the greatest use to the army; the strength likely to be made available cannot as yet be estimated.

The reserves consist of the National Guards of the several States (there are twenty-seven), and of the one federated district associated with them. Such permanent troops as exist in the several States not belonging to the National Guard are to form the first quota towards completing the army on mobilization.

Strength of tactical units in peace :—

	Officers.	Non-com. Officers.	Men.	Horses and mules.
Infantry battalion	39	123	534	42
Cavalry squadron	8	19	88	116
Artillery field battery (6 guns). .	8	32	82	165
Artillery mountain battery (6 guns)	8	38	82	86

Except that the infantry battalion has in war 822 men and batteries have 110 men each and about 30 more horses, the establishments in peace and war are for all practical purposes identical.

The 12 cadre battalions have 11 officers, and each of their 2 companies has 71 men.

The 2 regional battalions garrison Yucatan and Tampico, and are named after those places. Their strength is each 12 officers, 30 non-commissioned officers, 12 musicians, 147 privates.

The 7 regional companies are distributed 1 each in Campeche, Tabasco, Acapulco, Coatzacoalcas, Salina Cruz, and 2 in North California. They bear the names of their garrisons, and vary in their establishment from 136 to 86 men, including non-commissioned officers. Together they number 38 officers, 164 non-commissioned officers, 28 musicians, and 648 privates.

The squadron in the cavalry cadre regiments consists of 4 officers, 14 non-commissioned officers, 3 trumpeters, and 54 troopers, with 4 officers, and 71 troop horses.

The 3 regional squadrons are located in the districts of Sonora, Chihuahua, and North California respectively, and bear the names of these places. Each of these squadrons has 6 officers, 1 telegraph officer with two assistants, 17 non-commissioned officers, 3 trumpeters, 56 troopers, and 3 train soldiers; also 7 officers' horses, 78 troop horses, and 8 mules.

The mounted military police consists of 1 squadron, numbering 8 officers, 20 non-commissioned officers, 4 trumpeters, 85 men, 2 drivers; also 8 officers' and 111 troop horses, and 10 mules.

The 4 battalions of field artillery have together 104 guns. Each battalion is formed, in peace, of 2 field and 2 mountain batteries, each of

6 guns and 2 horse artillery guns. In case it should seem desirable, the 8 horse artillery guns can be formed into a battery and attached to the cavalry.

The machine-gun artillery consists of 2 companies, each consisting of 6 officers, 29 non-commissioned officers, 4 musicians, 36 gunners, 41 drivers; with 12 machine guns, 6 officers' horses, 15 troop horses, and 88 mules.

Mobilization.—The commanders and staff are not appointed beforehand. Brigades of cavalry and infantry would be constituted of 3 regiments or battalions each. Divisions would consist of 3 brigades; army corps of 3 divisions; and an army command of from 2 to 3 army corps. Each staff, from the brigade upwards receives a cavalry escort of from 10 to 18, or 27 troopers.

On mobilization the 28 infantry battalions are raised to war strength by the addition of 42 men per company.

The 12 cadre battalions are raised to the normal peace strength.

In the cavalry of the line 8 men and 8 horses are added to each regiment; in the cadre regiments 10 men.

Each field and mountain battery is augmented to 8 guns; the machine-gun artillery to 32 machine guns.

AUSTRIA-HUNGARY.

The year 1897 did not witness any far-reaching changes in the organization of the army.

In April a third inspector-general of troops was nominated in the person of the former commander of the 3d Corps.

In May a 4th Landwehr cavalry brigade command was established and located at Debreczin.

In October, a 16th company was added to each of the 4 Bosnia-Herzegovina infantry regiments; this completes the formation of these regiments.

Cavalry.—New regulations were issued respecting the organization of the regular cavalry, in which the changes introduced during recent years were embodied. The regular cavalry consists of 42 regiments, of which 15 are dragoons, 16 hussars, and 11 lancers; these are named after the colonel-in-chief of the regiment and have also a consecutive number.

The regiments are as a rule located territorially, and are grouped in brigades, and also in part in divisions, of which five are formed.

In peace each regiment is divided into the regimental staff and 2 divisions, each of 3 field squadrons and 1 ersatz squadron. There are also 1 pioneer sub-division and 1 telegraph patrol with each regiment. The regiment is commanded by a colonel, the 2 divisions by a lieutenant-colonel and major respectively. The 6 field squadrons have 30 officers, 871 mounted men, and 126 dismounted men of other ranks.

The ersatz cadre consists of 4 officers and 23 men, 6 of whom are

mounted. The total of the entire regiment is 45 officers and officials, 1043 other ranks, and 973 horses.

As compared with the previous establishment, this shows an increase of 2 subaltern officers, 2 telegraphists (mounted sub-division leaders), and 2 mounted sanitary assistants. The number of non commissioned officers is increased by 25 corporals and 26 patrol leaders, an equivalent reduction being made in the number of troopers.

The men and their horses belonging to the pioneer sub-division are on the establishment of the field squadrons in peace; in war a pack-horse is added for the transport of explosives.

The telegraph patrol consists of 2 sub-division leaders and 2 orderlies; its duties are to transmit reports and orders by telegraph.

The Hungarian Landwehr cavalry has also been given a revised constitution, which includes the changes carried out in 1896, by the creation of 2 patrol-leaders per squadron, the addition of 2 sanitary assistants to the regimental staff, and the increase from 5 to 8 of the squadron pioneers.

This cavalry consists of 10 hussar regiments, having each a regimental staff, 2 divisions (*en cadre*), and 1 ersatz cadre; during the autumn exercises and on mobilization 1 pioneer sub-division and 1 telegraph patrol are formed.

The regiments are grouped in brigades, and are as a rule located in the areas in which they would be completed.

The establishment of a squadron, in peace, is 4 officers, 65 men, and 30 horses. From October to the end of January they have in addition 10 remounts, and from February to September 24 remounts. The permanent establishment of the whole regiment is 39 officers, 420 men, and 259 horses; in addition, from October to January there are 60 remounts, and from February to September, 145.

RUSSIA.

<i>Peace Strength in Europe and the Caucasus.</i>	<i>Elsewhere.</i>
Infantry 497,000 men.	66,000 men.
Cavalry 109,000 "	10,000 "
Artillery 107,000 "	8,000 "
Engineers 21,000 "	3,000 "
Administration 34,000 "	5,000 "
Total 768,000 "	92,000 "

Together 36,000 officers, and in round numbers 860,000 men, not including the frontier guards, convoy escorts, military police, and fleet; but including Cossacks, Finns, native Caucasian troops and militia.

War Establishment:

Field troops.

Infantry 973 battalions	} Including Cossacks of the 1st category.
Cavalry 716 squadrons . . .	
Artillery 509 batteries . . .	

Engineers . . 35 battalions, 8
half-battalions
Train 22 to 24 battalions,
each divisible
into 5 war
transport
trains = 27,400 officers, 1,269,000 men.

Reserve troops.

Infantry . . 649 battalions
Cavalry. . . 580 sotnias. . . . { Cossack of the 2d and 3d
categories.
Artillery . . 124 batteries and 18 Cos-
sack batteries.
Engineers . . 5 battalions = 14,300 officers, 789,000 men.

Fortress troops.

Infantry . . 155 battalions
Artillery . . 57 battalions, 10 com-
panies, 1 detach-
ment
Engineers. . 5 battalions = 4,000 officers, 262,000 men.

Ersatz troops.

Infantry. 4,400 officers, 270,000 men
Cavalry, 800 " 40,000 "
Artillery, 600 " 30,000 "
Engineers, 100 " 6,000 " = 5,900 officers, 346,000 men.

Reichswehr.

Infantry, 9,500 officers, 986,000 men.
Cavalry, 350 " 22,000 "
Artillery, 450 " 28,000 "
Engineers, 100 " 4,000 " = 10,400 officers, 740,000 men.
Frontier Guards 1,000 " 34,000 "

63,000 " 3,440,000 "

Infantry Formations.—The most important change, though it had been long foreseen, was the order for the formation on the 1st (13th) January, 1898, of 2 new army corps. These are to be numbered 20 and 21, the first being formed in the military district of Vilna, and the other in that of Kieff. The staff quarters of the 20th Corps are fixed at Riga, and of the 21st at Kieff. These army corps are formed from the reserve infantry brigades already existing in these districts, each of which was previously composed of 4 regiments of 2 battalions. These 4 brigades have now been constituted as 2 complete divisions, composed of 4 regiments of 4 battalions. The other 2 divisions, 1 for each new army corps, have been taken from previously existing army corps. Thus the 20th Army Corps has received from the 3d Army Corps (Riga) the old 29th Division and the new 45th Division; the 21st Army Corps has been

made up of the 33d Division from the 9th Army Corps (Kieff), and the new 42d Division.

The places of the 29th and 33d Divisions in the 3d and 9th Army Corps respectively have been taken by the 43d and 44th new Divisions.

Cavalry.—By an order of the 8th (20th) September, a 3d independent brigade, composed of the newly-formed regiments Novo Alexandrovsk No. 53, staff at Vlozavek, and Novo Mirogradsk No. 54, staff at Kolo, has been added to the 2 previously existing.

The 3d guard cavalry brigade, which has belonged hitherto to the 2d guard cavalry division, but has been located in Warsaw, has now been combined with the newly-formed 3d independent brigade, referred to above, in a new cavalry division.

This combined division has been united with the independent 15th cavalry division (Warsaw District) in a new cavalry corps, designated the 2d, with its staff quarters at Warsaw. The previously existing cavalry corps is henceforth to be designated the 1st.

Artillery.—The field artillery has been greatly augmented during 1897, and changes have been made concurrently in its organization.

Altogether 68 light batteries and 1 mountain battery have been newly formed. Of these, 24 have been allotted to 4 new field artillery brigades of 6 batteries; 2 guard batteries to the guards rifle brigade, which has hitherto been without artillery; 3 grenadier batteries as the 3d division with the grenadier brigade; 2 batteries in augmentation of the previously existing artillery (6 batteries) of 16 of the brigades; 2 batteries for the Caucasus rifle brigade, which loses 1 of its 2 mountain batteries; 2 light reserve batteries and 1 mountain reserve battery for the newly-formed Caucasus reserve artillery brigade, which also receives a light battery.

The batteries to be raised are, in the case of the 39th Brigade, to have in peace 8 horsed guns and two ammunition wagons, in 7 brigades there are to be 8 horsed guns, and the rest are only to have 4 guns horsed.

A portion of the mountain batteries existing in the old brigades Nos. 20, 21, and 39, is to be converted into light batteries, and another portion to be distributed more widely amongst the brigades. The organization of the Caucasus artillery brigades is to be in divisions of 2 to 3 batteries.

The strength and organization of the European and Caucasus artillery, resulting from the changes described, are from the 1st January, 1898, the following: 2 artillery brigades, the 3d guards and 1st grenadier brigades, have each 9 batteries in 3 divisions; 21 brigades have each 8 batteries formed in three divisions, the 1st and 2d of which each consists of 3 batteries, the 3d of 2 batteries.

The 4 Caucasus artillery brigades have each 7 batteries, 6 of which are formed in 2 divisions of 3 batteries; the 7th stands alone and is a mountain battery.

All the other 25 guard, grenadier, and field artillery brigades, including the 4 newly-formed in 1897, have each 6 batteries in 2 divisions of 3 batteries each.

The artillery with the various rifle formations includes 1 division of 2 batteries with the guards rifle brigade; 5 divisions of 3 batteries for the 5 European rifle brigades: 1 division composed of 2 light batteries and 1 mountain battery for the Caucasus rifle brigade.

There is further 1 Finland regiment of 4 batteries.

Reserve Artillery Brigades.—6 European brigades of 6 batteries and 1 Caucasus brigade of 3 light batteries and 1 mountain battery. There are also 1 reserve cadre battery and 2 ersatz batteries.

The Asiatic artillery and mortar batteries remain unchanged.

The most noticeable of these new formations, which by their number alone are remarkable, is that of the 4 new field artillery brigades, Nos. 42, 43, 44, and 45. Following immediately on the old 41 field artillery brigades, they are like these allotted to the 4 new infantry divisions bearing the same numbers.

These changes in organization also exercise a material influence upon the state of the reserve artillery in rear. Besides the previously existing 6 reserve artillery brigades, a Caucasus reserve brigade of 4 batteries has been formed. This will allow of the reserve brigades (in war, divisions) still existing as such, being provided with a stronger proportion of artillery than formerly. In place of each reserve division of the first order having 4 batteries, it will now have 6.

The number of previously existing mountain batteries has been decreased, their places being taken by light field batteries; the whole of the new batteries are of this nature. Excepting in Asia, mountain batteries only exist now in the 13th Artillery Brigade, the 4 Caucasus brigades, and the artillery division with the Caucasus rifles. The further reduction of the number of mountain batteries is contemplated, and an order of the 9th August, 1897, provides that the existing mountain artillery regiment (in peace 3, in war 6 batteries) in Kieff is to be abolished on the 1st January, 1899; 2 mounted mountain batteries are to be formed in its place.

Flying parks (in war, park brigades) have been formed for the new 42d, 43d, 44th, and 45th Field Artillery Brigades. The artillery brigades to be formed only upon the mobilization of the reserve artillery do not receive flying parks, but seven reserve artillery parks are to be formed in peace in place of the "mobile parks," which have been done away with. The single East Siberian park previously existing has been expanded into 2. In war they become the 1st and 2d East Siberian Park Brigades respectively.

By an order of January, 1897, a Caucasian siege artillery battalion of 4 companies has been formed. The battalions of fortress artillery at Sveaborg, Kovno, Assovjetz, Warsaw, Novogorjevsk, Ivangorod, and Zegrsze have been placed on an increased peace establishment.

Engineers.—The Trans-Caspian sapper company has been replaced by a sapper battalion of 3 companies, 1 of which is a telegraph company. The Turkestan sapper half-battalion has become a battalion of 4 companies.

The 14th, 15th, 16th, 17th, and 19th European Sapper Battalions have been provided with telegraph companies, and have now each 4 companies. Two new minor companies have been created in the Amur military district; 1 company is for the defense of the mouth of the Amur, the other is located at Novokijeveskoe, in the Bay of Posjet.

A new fortress balloon section has been formed at Jablona, near Warsaw. A fortress telegraph section has been formed for Vladivostock.

Inspection in Field-firing.—A new development in the training of the troops was tried at the camp of Krassnoe Selo with such good results as to lead to the anticipation that the procedure followed may be generally adopted. The exercise was in the first instance in the nature of a manoeuvre with opposing forces of all arms, and it took its course until a defensive position having been taken up by the one force, the commander of the other force had reconnoitred this position and issued his orders for its attack. The situation was then marked by flags, and the attacking force marched back to camp, while the force on the defensive put out targets to represent its dispositions before it returned to camp.

The following day the attack was carried through by the attacking force with shell and ball ammunition, the defenders being formed up in the vicinity outside the sphere of fire to witness the results.

Training of Infantry and Cavalry in Artillery Exercise.—A great extension has been given to the training of officers, non-commissioned officers and men of the other arms in the service of field and horse artillery guns. During the past three years this training has been confined to men of the guard infantry and cavalry. Last summer it was extended to non-commissioned officers and men of the 24th Infantry Division, and the programme was so far enlarged as to include the training of non-commissioned officers of the cavalry and the 24th Infantry Division to act as No. 1 of a gun. The officers commanded sections. On the 22d July, 3 foot batteries and a horse artillery battery of war strength composed in this manner were inspected by the Grand Duke Vladimir.

SWITZERLAND.

Field Army.—With the exception of the sanitary train and of companies of position, which are furnished from the Landwehr, the field army was formed entirely of troops belonging to the Auszug. These are composed of the yearly classes between the ages of 20 and 32.

The units are numbered throughout the 8 divisions or 4 army corps.

The infantry and engineer companies (with the exception of the telegraph companies), the artillery regiments and mountain batteries and

some variations in the larger bodies are exceptions to this rule. Each army corps consists of 2 divisions each of 2 brigades, and comprises 8 infantry regiments numbering 24 battalions (the 1st Army Corps has 23, the 4th Army Corps 22 battalions only), 2 of which are rifle battalions; 1 cavalry brigade of 2 regiments each having 3 squadrons, and 2½ companies of guides; 2 units of divisional artillery and 1 of corps artillery, each of 2 regiments of 2 batteries, and 1 corps park; 2 half-battalions of engineers, 1 field bridging detachment, and 1 telegraph company; 2 divisional and 1 corps field hospitals, having together 10 ambulances; 1 corps supply establishment and 2 administration companies; and 3 cyclist sections.

There are further, unallotted to army corps, 1 company and 2 half-companies of guides, 1 regiment of 2 batteries mountain artillery, 3½ formations of artillery of position comprising 14 companies, 1 railway battalion, 2 ambulances and 1 cyclist section.

Garrison Troops.—The garrisons of the St. Gothard and St. Maurice are composed as follows:

St. Gothard—Infantry.—2 battalions of Auszug, 2 regiments and 1 battalion of Landwehr.

Artillery.—2 fortress companies, 1 unit of artillery of position, composed of 2 companies each of Auszug and Landwehr, 1 field artillery battery of Landwehr.

Engineers.—4 companies of sappers of Landwehr, 1 telegraph company Landwehr, 1 ambulance Landwehr.

St. Maurice—Infantry.—1 battalion Auszug, 1 regiment Landwehr.

Artillery.—1 fortress company, 1 mountain battery Landwehr, ½ a unit of artillery of position, composed of 2 companies, 1 each of Auszug and Landwehr.

Engineers.—1 sapper company Landwehr, 1 telegraph company Landwehr, 1 ambulance Landwehr.

As a security against a *coup de main* before the mobilization of these troops has been completed permanent guards are employed.

Landwehr.—This category includes all men from their 33d to their 44th year of age. They can be employed either to reinforce the field army, or as garrison troops, or for territorial duties. Its units have, with some exceptions, the same composition and numbering as its corresponding units of the field army. In consequence of the garrison troops being separated from the rest, the 2d, 7th, and 15th brigades were broken up, and the 3d, 13th, and 30th Regiments were allotted to the 1st, 8th, and 16th brigades as 3d regiments, and the 4th Rifle Battalion to the 16th Regiment in the place of the 47th Battalion.

Of the 8 park columns, 2 are located in each of the four park depots, at Thun, Berne, Lucerne, and Schwyz.

Consequent upon the above there remain available for strengthening the field army, or for further employment on fortress or territorial services, the following Landwehr formations:

Infantry.—10 brigades of 2 regiments of 3 battalions, and 3 brigades of 3 regiments of 3 battalions, 7 rifle battalions.

Cavalry.—24 squadrons dragoons and 12 companies of guides.

Artillery.—7 field batteries, 1 mountain battery, 5 companies of artillery of position (ersatz reserve), 2 ordnance companies, 16 train sections.

Engineers.—11 companies sappers, 2 field bridging sections, 2 ½ telegraph companies, 4 railway companies.

Sanitary.—16 ambulances, three sanitary trains, 5 transport columns, 8 hospital sections.

Administration.—8 companies.

Territorial Troops.—In addition to such Landwehr formations as may be left available for the purpose, the Landsturm comprises all males fit for service between the ages of 17 and 50 years, who are not enrolled in the Auszug or Landwehr.

Strength.—The following table shows the establishment on the 1st January, 1897.

Nature of Category.	General Staff and Rail- way Division.	Infantry.	Cavalry.	Artillery.	Engineers.	Sanitary Services.	Adminis- tration.	Cyclists.
Auszug	66	105,542	3,972	21,803	6,209	5,053	1,591	245
Landwehr	42	58,528	3,261	12,511	3,849	3,428	855	—

Landsturm.	Fusiliers.	Rifles.	Artillery of Position.	Pioneers.	Auxiliaries.
Officers	1,669	123	101	688	—
Non-commissioned Officers	6,257	446	470	1,531	—
Men	40,877	3,187	2,372	100,015	110,818

New Landwehr Law.—In 1897 a new law was adopted for the regulation of the infantry. Thirty-three battalions, of the 1st levy, are to be formed from the fusiliers passed to the Landwehr from the 96 fusilier battalions of the Auszug, and 1 rifle battalion of the 1st levy from the riflemen passed from each two rifle battalions. For this purpose the 7 annual classes from the 33d to the 39th year of age inclusive are employed.

Subaltern officers are liable to serve with the battalions of the 1st levy until the completion of their 44th year of age, but they may be transferred earlier to the 2d levy. Equally, supernumerary officers of the Auszug may be transferred to serve with the 1st levy battalions of the Landwehr.

Regiments can be formed of from 2 to 4 of these battalions, and brigades of from 2 to 3 regiments, which can be attached to army corps as necessary. The classes between 40 and 44 years of age, which are the

five oldest classes belonging to the Landwehr form the 2d levy and furnish, equally with the 1st levy, 33 battalions, with an establishment to be fixed by the Bundrath. Provision is made for forming the battalions into regiments, but no brigade organization is contemplated for these formations of the 2d levy.

The numbering of the battalions is the same in both levies. It begins with 101, so that as a rule the Landwehr battalions have the regimental number of their battalions of the Auszug plus 100.

Artillery and Train of the Landwehr.—As with the infantry battalions, so also with the previously existing 8 field and 2 mountain batteries of the Landwehr, it was decided that sufficient value was not obtained from the organization in force. At the same time it was recognized that the park columns and ordnance companies of the Auszug could be furnished without difficulty by the Landwehr.

From the 1st January, 1898, therefore, the 16 park columns and the 2 ordnance companies of Auszug were disbanded, as were in the Landwehr the 8 field and 2 mountain batteries, the ersatz reserve of the artillery of position, the train sections of unequal numbers (1 to 157) and the 2 ordnance companies.

From the same date there were newly formed: 8 field batteries (Nos. 49 to 56) and 2 mountain batteries (Nos. 2 and 3) for the Auszug, and for the Landwehr 16 park columns (Nos. 1 to 16), 4 staffs of park depots (Nos. 1 to 4), and 8 park depot companies (Nos. 1 to 8), 4 park columns (Nos. 1 to 4), 5 companies of position (Nos. 11 to 15), 5 transport companies of position (Nos. 1 to 5), 4 sanitary transport companies (Nos. 1 to 4), 1 train division (No. 9), and 8 train detachments (Nos. 1 to 8).

The divisional and corps artillery form each 1 regiment of 2 divisions; in the divisional artillery each division is of 2, and in the corps artillery of 3 batteries.

The previously existing 2 mountain batteries are renumbered 4 and 1 respectively. The 4 mountain batteries will now form, with the 4 park columns, a mountain artillery regiment.

The reorganization includes an increase to each company of artillery of position of 2 officers and 46 men, which brings its strength up to 8 officers and 162 men. The establishment of guns is augmented to sixteen 12-centimetre guns, twelve 12-centimetre mortars, and twelve 8-centimetre guns, in all 40 guns. Each of the 5 divisions of artillery of position is formed, from 1st January, 1898, of 2 companies Auszug, 3 companies Landwehr, and 1 transport company Landwehr. Hitherto the companies have been formed 1 from each canton, but they are now to be composed of the men passing into the Landwehr from the field batteries in the proportion of 1 company from groups of from 4 to 6 field batteries, which in part belong to several cantons.

The ammunition park of an army corps will be formed entirely of Landwehr. It is composed of a mobile corps park and a park depot, the former consisting of a staff and 4 park companies, each with 16 two-

horsed infantry ammunition wagons and 14 four-horsed artillery wagons and store vehicles; the latter of a staff and 2 park companies.

As regards the train, the sanitary transport company of an army corps is composed of the officers and men of the transport of the divisional field hospital and the corps field hospital, and also of the ambulances of the Landwehr. It is supplied from the men of the second unit of corps artillery who pass from the Auszug.

The previously existing 8 Landwehr sections of even numbers (2 to 16) are renumbered from 1 to 8, and the new 9th section is formed of men of the line train of the corps establishment passing from the Auszug. The odd numbers (1 to 9) provide for the horsing of the sanitary transport companies; the even numbers (2 to 8) augment the supply trains for the eventuality of the 1st levy of the Landwehr infantry being embodied in the army corps. The line train of divisions provides in the Landwehr the line train of the battalions of the 1st and 2d levies; the men remaining over from a train-detachment by divisions, which bears the number of the division concerned (1 to 8) and is available for mobilization and etappen services.

Garrison Troops.—The reorganization of the artillery and Landwehr infantry has led to the following modifications:—

Fortress Troops of the St. Gothard.—Two fortress artillery divisions, Nos. 1 and 2, each composed of from 2 to 3 sections, each with 4 machine guns. One fortress company (No. 1).

Fortress Troops of St. Maurice.—One fortress artillery division, No. 3, with staff, 2 gunner companies, 1 observation company. One machine gun company, No. 3, of 3 sections, each with 4 machine guns. One fortress company, No. 3.

The Landwehr men of these fortress troops form the ersatz reserve for the Auszug, and are not therefore always formed in separate units.

Ersatz Troops.—For 1897 there were 18,680 recruits raised for the ersatz service, of whom 16,036 were exercised in 1896.

They were distributed as follows:—Infantry, 15,206; cavalry, 557; field artillery gunners, 344; field artillery train soldiers, 510; mountain artillery, 120; fortress artillery, 245; artillery of position, 221; train, 446; engineers, 411; sanitary service, 479; administration, 141.

INFANTRY, CAVALRY AND ARTILLERY TACTICS.

VON LÖBEL'S ANNUAL REPORTS.

(From *The Royal United Service Institution.*)

INFANTRY TACTICS AND THE EMPLOYMENT OF THE COMBINED ARMS.

A WORK by General von Schlichting, entitled "*Taktische und strategische Grundsätze der Gegenwart*," which was published last year, forms the basis for the discussion of an interesting point of tactical procedure. It refers to the withdrawal of company supports (the "*petits paquets*" of the French), and, in connection with this, to the extension of entire companies of a battalion from the outset.

This is provided for by the regulations in France and Russia (provisionally), whereas in other armies the small supporting bodies still play their part.

General von Schlichting advances the following grounds for the latter procedure :—"The company on a war strength, after it has been extended, is no longer in the hands of its leader when working over ground in touch with the enemy. The premature extension of the entire unit promotes this tendency, which was in time excluded, as being so objectionable for fighting in extended order. In varied ground one wing may be brought to a standstill by the opportunity of producing a favorable fire effect, while the other advances as ordered; between the two, imagine the company leader, who will have dismounted, at this time maintaining the unity of his command. Upon entering on the fight an extension *zug* by *zug* recommends itself—if at all practicable—especially as a change will have to be made in direction in the majority of cases, at first in most, and small deployments will enable this to be most easily effected. There must be new men at hand to fill the gaps, and maintain the intensity of fire at an equal degree. It is all very well to preach that small closed bodies behind the firing line are receptacles for bullets, and will suffer losses, without at the same time making any preparation, in the event of being afterwards obliged by the procedure adopted, to place other battalions behind those which are fighting entirely extended."

The French regulations advance the following reasons against the extension by successive portions :—"The supporting bodies are not sheltered from the fire directed upon the firing line in their front, and suffer losses, without themselves being able to take part in the fighting. The company when broken up is in part no longer under the immediate leading of the captain. The subordinate bodies may come under the orders of inexperienced leaders, who will not always handle them properly, and will allow the proper moment for their advance to pass. Lastly, the pushing up of reinforcements produces the premature inter-

mixture of units, it makes leading difficult, and acts detrimentally upon the good delivery of fire."

The Russian regulations (provisional) justify in the following terms the elimination of the company reserves when working with the battalion:—"It is necessary to bring into action the greatest number of rifles possible, to place from the first the conduct of the fire in the hands of the experienced company leaders, and to minimize the losses, by withdrawing from exposure to hostile fire the generally useless supporting bodies. By the extension of entire companies (the provisional regulations lay down that in normal conditions two whole companies are to form at first the firing line, and the remaining two the battalion reserve), the battalion commander has for the time two formed companies under his hand, whereas with the system of small fractions he has perhaps one intact company at his disposal, but often only the supports will remain available as reserves, which does not suit him at all, for they are under the company commander who is in front."

Other reasons could be added to these, amongst them the ballistic consideration, that three echelons of troops (firing line, supports, and reserve companies) pressing closely upon one another in a comparatively restricted space, will suffer greater losses both from artillery and infantry fire than two echelons (firing line and reserve companies) occupying an equal space.

Equally, greater simplicity cannot be denied this formation, and, as regards simplicity in tactical procedure, the late General von Schacht-meyer has strikingly remarked:—"True tactical wisdom lies in simplicity, which spares the tactical mediocrity, with the pain of choice, much embarrassment."

If one considers the divergent views that exist, even on the parade ground, about the position of the supporting bodies, their distance from the skirmisher line, and the manner of their advance, and takes also into consideration the inherent weaknesses ballistically of this formation—which may 25 years ago have been quite practicable—it must be recognized that its days are numbered.

It is interesting to note the statement of an adherent of this formation, who has written:—"It is impossible for supporting bodies in close order, with two ranks, to advance under uninterrupted infantry fire at close and medium distances." (*"Einleitung und formale Taktik der Infanterie,"* Captain von Balck. Berlin, 1897.)

The defenders' infantry fire at medium distances will be almost always uninterrupted. The supporting troops should contribute towards interrupting it; but if at medium distances—from 1000 metres—they are impossible, they lose the advantages claimed for them (reinforcement of the skirmisher line, and reservoir for this).

They must, therefore, follow with rank entire or with opened ranks; but of this, in Germany at least, the adherents of small bodies as supports will not hear. There is then, tactically, a vicious circle amongst

the friends even of the "petits paquets," and, therefore, the two most recent regulations—the French and the Russian—seem to have taken the right course in putting an end to it.

As regards the system of scouts (*éclaireurs* in France and *okhótniki* in Russia), its fundamental idea is no doubt tactically correct, in so far as it allows of the deployment of the skirmishing line for the purposes of security and information taking place as late as possible, which is always an advantage from the point of view of leading. But owing to the exaggerations of this system, as practised in France, its value has been affected. The arrangement by which a thin screen of patrols is pushed forward until the distance from the enemy is reached at which the fighting of the advanced skirmisher line begins, can only contribute to secure the first deployments and carry them out more quietly.

The infantry fight requires above everything quiet in its preparation and first development. It is a dangerous deception to judge of the tactical skill of a leader and the tactical capability of a body of infantry from an impulsive and smartly engaged fight. True smartness and enduring energy only show themselves in the carrying through of a fight; but before the infantry is so far, before it is really engaged, a tactical organization must be arranged quite quietly, which shall insure unity and endurance of effect.

In the past year the conviction seems to have gained more ground in infantry circles, that our tactical training must be based on the conflict of masses and not on mere engagements. This does not in any way exclude the greatest care being devoted to the training of the infantry soldier in fighting alone, but battles are not won by means of such fighting nowadays.

But the so-called "Auftragverfahren," or the giving of general instructions, leads to isolated engagements. Writing of the system in his "Betrachtungen über Heerwesen und Kriegführung" (Berlin, 1897), Lieutenant-General von Boguslawski expressed himself in the following terms:—"Far be it from us to dispute that such a procedure may, especially in the case of a single battalion or regiment, be quite sound. But it seems to us wrong to erect it into a principle, to an exclusive method.

"We think that for any officer who has fought in great battles as an infantry soldier this must be patent. We would ask then where the instructions for battalions and companies come in?

"In the great majority of cases the affair will develop in such a manner that the commander of the regiment or the battalion deploys his troops in such a direction and in such a manner as to leave no doubt. If time admits of it, he states briefly the object of the engagement, gives a point of direction or himself leads a fraction which is followed by the rest, orders the formation of the whole and moves forward. In such a case what is the good of giving independent instructions, which occupies time, and often opens the door to misunderstandings?"

It may be added that it is much easier generally to give indefinite directions than a definite order. The officer who gives an order undertakes a greater responsibility than the one who gives directions only, and who, if things go wrong, will be inclined to seek for the fault in a false appreciation of his instructions.

Instructions may often be appropriate for cavalry and artillery; but seldom for infantry, at least, in bodies from the brigade downwards.

In any case, orders which say neither too much nor too little will contribute towards making a certain unity in the handling of the troops more possible than if they were operating under instructions only. But the infantry is the worst of all the arms as regards the unity and lucidity of its tactical action, and therefore the effort to limit tactical friction as far as possible rather than to increase it seems justifiable. The war machine, which has to overcome the inevitable friction of battle as best it may, insures by this means a main chance of victory. A regiment or a brigade which is accustomed to work by order in the first stage of the fight, makes even in peace a more certain impression. It is said to be in the hand of its commander. But whoever understands by "orders," on the battle-field, the more or less mechanical importation of drill-ground customs will undoubtedly suffer tactical shipwreck before the enemy.

The reader will, perhaps, have asked impatiently already when he is to hear anything of the actual fighting of infantry, of fire tactics. But this latter is not a thing standing by itself, but it is rightly appreciated in the closest connection with the preparatory measures for the actual fight, which is one of massed fire, and the tactician who is in a position to create the most favorable conditions for this massed fire-fight stands on the pinnacle of capacity. But this is naturally only to be attained by skilful arrangements for the march, deployment and engagement of the infantry masses. Higher tactics thus dictates the law to lower tactics.

Only, therefore, so much room should be given to detail as it deserves. All the science of infantry fire, all the individual training, are of no avail nowadays, unless the tactical leading understands how to combine them for a skilful, powerful effect.

It will seem to many that General von Scherff ("*Die Lehre vom Kriege auf der Grundlage seiner neuzeitlichen Erscheinungsformen.*" Berlin, 1897), especially by laying down tactical conditions for the attack of infantry, here and there in his philosophical formal demonstration goes beyond the living changing effects of the fight; but the substance of his demands to banish the arbitrary, the subjective, as far as possible, from the procedure of the fight, appears to many to be justified. Rules cannot be prescribed for the leading of the troops, because this depends chiefly upon the personality of the leader. But what in normal conditions the procedure of the infantry will be in the fight can be reduced as well to-day to a definite technical method, as has at all times been possible. The use of the skirmisher swarm need not alter this. However

this may be, in any case a growing reaction is becoming international against the so-called free procedure. This is evidenced not only by numerous literary expressions of opinion, amongst which are some of weight, but also by the direction taken in the latest regulations.

The requirements referred to must not be taken as being refuted by the sentence "superiority of fire is to be obtained by appropriate ways of leading," so far as an attack over ground more or less wanting in cover is concerned. Amongst these ways of leading are to be understood secondary methods, such as threatening the flanks, superior artillery effect, the production of concentric fire effect, the employment of the spade, of the night, etc. It is certain that the modern fight can afford less to dispense with such methods than formerly, but they will not absolve the infantry from the frontal attack of strong positions under difficult circumstances. The frontal attack of infantry forms on the contrary, as military history teaches, the substance of battles. Even the enveloping attack comes eventually to be a frontal one.

The entire modern tactical development tends towards the creation of a method of fighting which will support it in its difficult task.

In the controversy on this subject also too much stress must not be laid on the losses that might be incurred. At the time of the Silesian wars the effect of fire on attacking infantry was in its final results much more dreadful than it is now. But no one thought, on this account, of declaring the frontal attack of infantry a failure.

In France, as also in Austria and Russia, volley-firing plays a great rôle by the regulations. It was pointed out in the 1896 reports that objections had been raised to this preference for volley-firing, which recall too much the drill ground. It is claimed by its adherents that the leader who keeps his troops well in hand has a great advantage, and it will enable him to continue this method of firing. This is quite true, but the difficulty is to keep them in hand, looking to the many disturbing and disintegrating influences of the modern fight.

The principle of firing volleys is more or less based upon the retention of the troops in formations which generally appear not to be applicable in real war, on ballistic grounds, and upon their regular execution at medium distances, which will not be realized for psychological reasons. Exceptionally volley-firing may be applicable, but the future belongs to quiet individual fire, supported, and as far as possible influenced, by fire-leading and fire-discipline.

During the past year a reaction has also made itself felt in France against the principle which has been maintained there of late, that infantry fire should only commence at the limits of medium and close distances. In Germany, a short time ago, this theory had many adherents. In recent years, however, a change has been noticeable.

A French officer of reputation, General Philebert, has discussed this question (1, "*L'Instruction du tir*"; 2, "*L'Infanterie perd son temps*," Paris). He writes:—"It is said that good troops must approach as close

as practicable to the enemy before opening fire. That is no doubt a good idea, but it would be as good a one to say to a poor devil who is dying of hunger, be rich !

"Is it possible to open fire first at 600 to 700 metres? Is it credible and probable that men will march under rifle fire without replying to it? We do not believe it, and are strongly of opinion that fire draws fire, and that those who have to suffer from fire will reply to it. It may be fatal, but it lies in the nature of things. * * *

"At all times, fire has been commenced at long distances, even when the range of the bullet did not exceed 200 metres. At the present time, when the rifle is effective at 2000 metres, much time will be required to approach to from 500 to 600 metres; this is certainly not agreeable, but it cannot be altered."

The new Russian infantry drill is still regarded as provisional. As regards the method of attack, it occupies a middle place between the "free" procedure of the German pattern, and the normal dispositions of the French regulations.

In the first place, the distinction made in the German regulations between the *rencontre* battle and the attack of a prepared position is not adopted. The procedure is based on the ranged battle. This seems appropriate, first, because the fighting formations and the procedure of the infantry are the same in the *rencontre* engagement as they are in the planned attack—it is only the employment of the troops that differs—and consequently the regulations do not need to make any difference in this direction. Secondly, *rencontre* battles are more or less exceptional—often not desired—and regulations should not make provision for exceptional cases. Thirdly, the *rencontre* engagement only makes exceptional measures necessary for the foremost troops; the main body of the infantry, which has to carry through the actually decisive fight, is unaffected by it.

As soon as touch is established with the enemy, if it be not found possible to gain a clear knowledge of his situation, the advanced cavalry bodies are to be reinforced by the "okhótniki" of the foremost battalions—1 officer, 4 non-commissioned officers, and 16 selected and specially trained men per battalion.

The deployment of the infantry will take place in open ground at from 2 to 2½ versts from the enemy, or if he has artillery, at about 4 versts.

There are two phases in the attack that are particularly emphasized :

1. The advance as far as the decisive fire position.
2. The assault on the enemy's position itself.

Up to effective range, which for the defenders is taken to be 2000 paces, the companies of the fighting line move, preceded by a thin skirmisher veil, in ranks, with subdivisions on the same alignment, or in line. On getting within 2000 paces skirmisher lines are formed by the fighting line, which continues to advance quietly and uninterrupted.

Firing is only permitted at especially favorable objectives at this period. At from 1400 to 1000 paces firing becomes general. At this distance all the portions of the force destined for the attack must be drawn up on the proper front, because it is then impossible to move them into it.

The skirmisher line is gradually reinforced. Its further advance is carried out as far as practicable at a walk, either by the whole line together or by successive portions. The decisive firing position will be taken up at from 400 to 500 paces from the enemy. From here the decisive assault is made by the reserves, which have come up in the meantime, combined with the skirmisher line. If it is by any means possible a battalion or company is placed on one flank to enfilade the enemy.

The principle laid down in the Russian regulations, that the skirmisher line, as well as the rest of the troops destined for the attack, should make a continuous advance at a walk up to from 400 to 500 paces from the enemy, may be called in question from a tactical point of view.

If the ground permits of this procedure, so much the better for the attacker, who has to do with so stupid an opponent, who selects such favorable ground for the attacker. In the plains of Eastern Europe protection of this nature from the ground is seldom to be met with. And again, tactically, objection must be raised to fire position being fixed at from 400 to 500 paces of the enemy. In the Dutch regulations (equally of recent date) it is fixed at 700 metres, nearly double as far from the defender as the Russian. I believe practice will indicate it as from about 600 to 700 metres.

In spite of these echoes of shock tactics, the Russian regulations contain a very great deal that is sound respecting tactics, and much that is worthy of imitation in regard to the formations and distribution of infantry for the fight.

THE ACTION OF THE COMBINED ARMS.

Referring to the Kaiser manœuvres in Germany in 1897, the most noticeable tendency of the East Army was to avoid the strategy of detachments, and to enter the fight "massed," which was of great value to the tactical energy.

On the first day of the manœuvres a *rencontre* fight took place, when the great advantage to carrying it through of endeavoring to gain the objective by bringing the forces into action as simultaneously as possible was exemplified. The reestablishment of the fight by forces held back at first involves in war the more consideration, because peace manœuvres often offer a picture as regards this point that is altogether unreal.

When a body of troops is pushed back by superior forces, it implies nowadays a much more intense moral shaking than formerly, because the effect of the fire by which it is followed up is more intense. Such a body of troops is tactically of very little value afterwards.

If fresh forces now come into play, they can hardly be in a position

to reëstablish the lost moral firmness of the defeated main body. But in manœuvres such "partially defeated" troops are frequently treated again in a short time as nearly equally valuable tactical factors, however powerfully they may have been shaken. If now the troops that have been held back are brought into action, the principle of the last trump is applied in favor of those who, still unharmed, continue to co-operate with them.

It may often not be possible to alter this procedure in peace. But it implies a certain obscuring of the tactical matter of fact, and is contrary to the principle of bringing the forces into action, as far as practicable, united and simultaneously.

The character of the *rencontre* fight which the collision on the first day produced, raises another point for discussion as regards the employment of the troops. It may be taken to be generally known, that the *rencontre* battle, such as was frequently observable in the Franco-German War, is not to be regarded as answering to ideal leading, for it makes the planned and united employment of the forces very difficult, even when it does not preclude it, and favors the so-called soldiers' battle. But the science of leading troops must certainly reject this latter. It need not, however, prejudice the practical science of war to refer to the *rencontre* battle as an unavoidable episode of modern warfare.

The fact appears to be proved by what occurred at Hanau on the 6th September, 1897; for in this case a more accurate knowledge of the enemy's movements may be assumed than would be the case in war. Notwithstanding this, a *rencontre* battle ensued; and on closer examination another different kind of lesson may be drawn from it, which favors the opponents of this kind of battle.

In the course of the 6th September, 6 divisions of the eastern force could come into action against 3 divisions of the western, because the latter had an army corps so far in rear that its participation in the operations on that day seemed to be precluded. In these conditions was it for the west to decide upon a *rencontre* battle? Would it not have been of greater advantage to give up the offensive altogether on that day, so as to avoid the danger of an isolated tactical defeat, and to fight on the day following with the forces concentrated? The strategical grounds for adopting an opposite course, as well as the contention that the offensive always favors success, cannot refute the fact, that all strategy and every principle must completely fail, unless the tactical situation is such that chances of success exist. But when 6 divisions can be brought into action against 3 divisions the tactical chances of the latter are non-existent.

On the third day of the manœuvres an opportunity was given for the independent action of subordinate leaders, such as might arise in war, and such as would rightly be desired by every leader of troops. A division by the order of the army commander had made a movement with a view to seizing a specified position. The opponent utilized the

gap that resulted from the movement to get round the flank of the troops engaged in the first line. In spite of the definite order, the division referred to at once stopped its advance, and entered the fight independently, by which means the line was preserved from being broken through. This was real independence, which systematically and on a just consideration of the pros and cons, did not hesitate to depart from an order that had been received.

Such independence must not be confounded with what is to be understood by the term independence as applied to the subordinate leaders, down to the smallest tactical units. The same divisional commander, who in this instance was quite satisfied that the situation did not admit of waiting to deploy the division, but attacked with all available forces, would in all probability have strongly deprecated regiments or battalions acting separately on the initiative of their commanders during the execution of a planned attack.

There is only this to be added to this instructive practical example: the principle of independence can only be awarded a restricted space in the actual procedure of the battle-field, without endangering seriously the unity of the tactical handling. On the other hand, independence in the right place as an attribute of a leader, will come of itself to every intelligent officer who has character. If these characteristics should be wanting, a uniform regulation pattern accentuation of "independence" may easily lead tactically to more harm than good.

On this occasion (1897) the cyclists have taken their place at the great German manœuvres as organized troops. This organization was indeed only a provisional one, and one cannot but agree with the opinion that is gaining ground, that the cyclists must be given a permanent tactical organization as fighting troops. Undoubtedly an organization effected when the necessity arises, or a body of men got together a few weeks previously will always be inferior compared with cyclist troops with a solid organization, as is the case with every military improvisation.

The idea of employing cyclists as fighting troops has been scientifically supported for some years, without—except in the case of some small armies—finding general practical recognition. This is the known sorrowful history of most military novelties. At first the right of existence was denied them for reconnoitring and reporting duties. Then the utility of their employment as fighting troops was doubted. There ought now to be an end of this doubt. Notwithstanding various entirely inaccurate reports in the press, it must be established that the fighting cyclists repeatedly did right good service at the German manœuvres.

With the Bavarian portion of the army (east), a cyclist formation of about 100 men came into action. This was generally employed with the cavalry division. With the Prussian force (west), the several army corps had cyclist formations of from 60 to 80 cyclists each, which were allotted, part to the cavalry division and part to the advanced guards.

Notwithstanding that the German military cycle is rather heavy and not adapted to fold up, as is that in use in the French army, the cyclist formations succeeded in getting on, even in difficult country and on bad roads. They were repeatedly able to act effectively in occupying defiles, preventing or disturbing the construction of bridges, holding the enemy's advanced troops; in short, making themselves generally troublesome to the enemy.

With further organic and technical development, the cyclist troops of the future will no doubt also enlarge their tactical sphere of action, but only within certain limits; and their action should apparently be of greatest value in securing the tactical independence of the cavalry.

As regards the employment of cavalry—as forming part of the combined arms—it is to be noted that in the German Kaiser manoeuvres the divisional cavalry, in the middle of the front of battle, favored by the nature of the ground, found opportunities for successful attack by surprise on the exposed flank of the engaged firing line. It may be said that these were exceptional. Still they show that smartly led cavalry will find opportunities of coöperating with the infantry, as was actually the case on that occasion; in future cavalry will have probably to pay more attention tactically, not to acting for itself only, but to endeavoring to operate in closest connection with the engaged infantry.

It is generally admitted that the employment of field artillery in masses suitable to battle tactics was almost perfect during the manoeuvres in the Weterau. The conviction continues to gain ground, that in the present day the execution and final decision of the fight is principally dependent upon its preparation; and, consequently, that this preparation must be regarded as the most important stage, and not the so-called assault regarding the delivery of which everybody is racking his brains. This determines the great importance of the artillery, for to it falls the preparation in the greatest measure.

In connection with this, it is typical that this preparation by the artillery is no longer regarded, as formerly, as a gradual development of the intensity of the fight, but as a powerful effect of the artillery from the outset. To apply this idea sensibly to the employment of the infantry is the modern tendency of tactics, and the endeavor to give effect to it comes often into conflict with those who advocate the fight being engaged directly from the columns of march. The artillery has shown for a long time the sound desire to withdraw itself from this principle, consequently there is an ever-increasing departure from what was formerly the obligatory procedure of attaching artillery to advanced guards. On one of the manoeuvre days in the Weterau it happened also that the artillery was placed too far forward in the column; and it was not only forced to take up an unfavorable artillery position, but it found itself exposed to hostile infantry fire before it could be extricated by its own infantry. This happened during a *rencontre* fight.

On the other hand, it must not be overlooked that the employment

of artillery in masses in the first stage of the fight makes the question of space with reference to the infantry a difficult one.

In previous reports the tendency was noticed to recommend massed formations for the march before a battle, such as were repeatedly employed by Napoleon, but modified to suit modern requirements, as a tactical means of enhancing unity of action. General Lewal first sustained this idea scientifically, basing his arguments amongst other instances on the massed advance of the 2d German Army on the 18th August, 1870. General von Scherff came to similar conclusions in his well-known "*Kriegslehren*." General von Schlichting, however, rejects this procedure in his latest work, in which he writes:—"The movement of masses of troops larger than a brigade in assembly formation is no longer practicable on any ground. The return to column of march will then as a rule be advantageous."

General von Boguslawski supports the Lewal-Scherff view of this tactical disputed point, and proposes a definite mass formation for the advance of a mixed division. He says:—"It seems to us undoubted that the corps and divisions of an army accustomed to such mass formations can be more easily led and handled by the superior commander than troops that always move in long columns on the roads, and only form up when their heads are struck by the first bullets. The superior commander must always be conversant with the picture of the different formations, and, above all, he must not be prejudiced by the idea that in war marches of approach can only seldom be effected in such formations."

The tendency to march in widely separated columns should be restrained. Theoretically this course can be justified; the columns march separately with a view to attacking simultaneously. In war it has often failed on account of friction, which forms the rule rather than the exception. At the manœuvres (1897) in Moravia, the turning column arrived too late, for the counter-attack had been delivered by the defenders before it could make itself felt.

This example contains much that is instructive, not only in the tactical separation, but also in regard to the employment of the main reserve. Had the defender on this occasion followed the frequently quoted principle, that a reserve must be kept in hand to the last, he would naturally have retained his reserve intact to meet the attack of the enemy's turning column. In such a case the result would probably not have been in his favor, for a defender who is turned seldom succeeds in escaping from the tactical trap. By the early action of his reserve the defender in this case gained the victory.

By following this principle of keeping a reserve in hand to the last, a complete defeat is in some circumstances avoided; but by such false economy the chances of a decisive victory will be more often destroyed. It will therefore show a juster appreciation if the leader does not choose that principle as his tactical rule of conduct, but at the right moment puts his last breath into the decision.

CAVALRY TACTICS.

The extent of the action of cavalry in a battle, which has been freely discussed in German military literature, must be limited at the employment of cavalry masses against hostile infantry and artillery in the course of a battle. Cavalry duels in advance of the front or on the flanks will not be affected by the development of the effect of fire-arms, which forms the crux of the question.

Small bodies of cavalry, such as squadrons and regiments, which only require a small extent of cover for their preparatory position, and a small amount of space and time for their deployment will be able now as well as formerly to utilize a temporary exposure of the enemy at a point of the line of battle by rapid surprise. The threatening of unshaken infantry on its flanks, charging shaken infantry after abandoning a position or after attacking unsuccessfully, the rolling up of a flank of artillery that is *en l'air*, disengaging its own infantry or artillery when hard pressed, are affairs of the moment, the suddenness of which must lessen the effect of hostile fire, less for technical than for moral reasons.

It is different as regards the employment of cavalry masses in the modern battle; but this question seems to affect only the training of superior cavalry leaders. The local distribution of cavalry masses upon the development of the battle must be based in each instance on the operations that have immediately gone before, and on the suitability of the ground.

At the German Kaiser manœuvres in 1896 and in 1897, the ground on which the flanks of the infantry of the opposing forces rested excluded the cavalry being placed in the prolongation of the front, and they were behind it.

But in such conditions where the cavalry masses are first placed, there they will generally have to act; distance precludes great movements to a flank during the changing course of a battle.

A cavalry division in a preparatory formation suited to the ground will occupy as a mean 600 metres in breadth and 200 metres in depth. How near it can approach in this formation within the hostile sphere of fire, without its fighting power suffering prematurely, is a matter its leader must judge of by his previous practical study of the effects of fire, that is, by observation of field firing by the other arms in service conditions.

What space will be required for the deployment of a cavalry division for its attack on hostile infantry or artillery cannot be generally determined. It depends upon the measures taken by the enemy to meet it, and upon its own rapidity. In no case, however, should the space required and the time for traversing it be under-estimated. These considerations relegate the possibility of surprise by cavalry masses to a lamentably but unavoidably small chance, and make their intervention in the course of the battle exceptional.

But their success in the future is not questioned by anyone, always provided the passing favorable moment is utilized at the right time. The experiences of the last war (Kunz, Major a.D., "*Die deutsche Reiterei in den Schlachten und Gefechten des Krieges von 1870-71.*" Berlin, 1895) and the lessons offered by the constantly progressing effect of modern fire-arms, seem to point to the necessity for the thorough training of cavalry leaders during peace, the practical testing of which must be amply provided for by peace exercises.

The spirit of the new cavalry regulations that have been introduced during recent years points to the separation of the cavalry from intervention in the artillery and infantry fight.

The omissions and mistakes in the employment of the horse artillery belonging to cavalry imposes upon the superior commander a closer acquaintance with the working of this auxiliary arm.

However praiseworthy may be the initiative of a skilful artillery commander, the cavalry leader ought in no circumstances to forego the disposition of his batteries according to his own views.

FIELD ARTILLERY TACTICS.

The past year has at last brought a decision regarding the important question of the arming of field artillery, which since the introduction of smokeless powder—that is, for the last eight years—has occupied the thoughtful officers of this arm more than any other.

The new gun is a compromise between the adherents of a greater fire effect and those who advocated greater mobility. It is due to the advance made in technical art that a gun has been constructed which combines both greater effect and increased mobility, as compared with the old one.

As soon as the question of the pattern of the gun of the future was decided, that of its tactical employment came into prominence. The new gun combines a greater effect of the single shot with a greater state of preparedness. The question of its employment, and of the organization of the field artillery, which is closely connected with this, can be answered in two ways, according as greater value is attributed to quiet, well-directed fire, that is, to the effect of striking the target or to a greater quantity of rounds being fired in a short time—that is, to the greatest possible rapidity of fire.

The advocate of quiet, well-directed fire, with observation of each shot, will desire strict centralization in the hands of the battery leader, which is only possible with sub-division fire; this view, therefore, would point to the necessity of reducing the number of guns in a battery from 6 to 4. This alone can secure the greatest use of the power of the gun, quiet service, and sufficient ammunition supply. For in a battery of 4 guns, each gun can be provided with a greater number of rounds than in a battery of 6 guns, without an increase in the number of ammunition wagons. But if the best value be attributed to the highest

development of rapidity of fire, this must necessarily lead to a change in the method and order of firing. Some advocate the ranging being carried out as now, and after it is completed would employ rapid fire. Others would leave the ranging to the observation of the sub-division leaders, and only fire by sub-divisions; a third party advocate the omission altogether of systematic ranging, and by means of rapid fire, would search an area of the breadth of the battery and 1000 metres deep, on the assumption that the target within this area must inevitably be struck.

We are of the opinion, expressed here on previous occasions, that quiet and well-conducted fire should always be employed, because it leads the most quickly to the desired end, with the least expenditure of ammunition. Certainly in ranging, and afterwards, well-aimed, observed, and well-sustained (not rapid) fire is certain of its success. The effect of fire is so great, that, if ranging is properly carried out, a few projectiles will secure the destruction of the object aimed at; rapid fire then is superfluous. But if the ranging be not properly done, rapid fire is pernicious, for it consumes the greatest amount of ammunition in the shortest possible time. Rapid and dependable ranging is of much greater value than rapid fire after the ranging has been completed.

Undoubtedly a small well-trained battery (of 4 guns) will range more rapidly and accurately than a large one (of 6 guns), for it is better under the hand of its leader.

The question of the bombardment of covered objects by the field artillery has entered on a new stage since the introduction of the new gun. This gun has, in a greater degree than the old one, the character of a flat trajectory gun, so that a high-explosive shell fired from it would have still less effect than if fired from the old gun. The introduction, therefore, of a field howitzer, which could do good service in the preparation of the infantry attack has become much more likely.

The howitzers would be united in divisions of from 2 to 3 batteries, and be distributed in the ratio of one howitzer division per army corps.

The important question, whether the corps artillery should continue to be organized separately as such, or permanently distributed to the divisions, is approaching a decision, for with the introduction of the new field-gun a change in organization can no longer be deferred. The number of advocates of the corps artillery has diminished steadily; for some time past they have not included any German artillery officers. On the other hand, General von Schlichting, in his recently published book, "*Taktische und strategische Grundsätze der Gegenwart*," advocates the retention of the corps artillery. He argues that the necessity for a strong deployment of artillery generally arises in the course of the engagement, to satisfy which the corps artillery can be employed, "serving thus as a kind of reserve formation such as is required by the other arms for carrying through their fight."

THE ORGANIZATION AND USE OF THE CYCLIST SERVICE IN THE FRENCH ARMY. *

TRANSLATED FROM THE FRENCH.

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PART I.—THE BASIS OF ORGANIZATION AND GENERAL PRINCIPLES.

MILITARY cyclists in the army are, first of all, estafettes, charged with the transmission of orders, reports, and of all kinds of communications, between staffs, troop-units, and services.

They may, also, be utilized, either individually or in small groups, to secure information, or, exceptionally, in larger groups, as detachments of scouts or of rapid-marching partisans.

Art. 2. Cyclists are recruited from the reserve and from the territorial army and, for the time being, will be required to furnish their own machines, under the conditions prescribed by the temporary provisions of articles 48 and following.

Art. 3. The government places, in time of peace, at the disposal of troop-units a certain number of machines, some gratis and others non-gratis. The former are ridden by soldiers of the active service, and are used for the general service of the unit. The latter are reserved to the officers, under the conditions of the subscription system defined in articles 35 and 36, in order to develop among them, in the interest of the service, a taste for cycling. The machines of the two classes constitute the material for the performance of cycling service in the fall manœuvres, and in the mobilization of the troops.

Art. 4. In the field and at the manœuvres, the different purposes for which cycle-estafettes may be used, vary according as the troops are on the march, in cantonments and in battle.

Art. 5. On the march the principal duty of the cyclists is to connect with the main body the different echelons of the first line of the security service, and the advance guard, the flank guards and parallel columns.

The use of the bicycle with the column depends on the width of the road and the march formation; it constitutes, in any case, only an auxiliary service. When the troops leave the road the cyclists do not follow them through the woods, but take advantage of the paths leading in the same direction, to keep themselves within reach in order to receive and transmit orders.

Art. 6. In cantonments, the cyclists are charged with the communication between the various cantonments. It will often be advantageous to organize the cycling service by cantonment. With the out-posts,

* Regulations of April 5, 1895.

† Published by permission of the War Department, Military Information Division, Adjutant General's Office.

they establish contact between the different echelons and with the main body.

Art. 7. In battle, the cyclists are used chiefly to connect the staffs with one another, and to keep up communication with the rear.

In the zone of the action proper, their use is necessarily very restricted; this zone is not their domain, as the troops have abandoned the roads and seek all the accidents of the terrain.

Except under particular circumstances, as soon as a body of troops takes the battle formation, its cyclists assemble on a road and as near as possible to the reserve.

Art. 8. The commanding authority is judge as to when the cyclists shall be used as prescribed in the last paragraph of Article 1.

Their exceptional speed, their ability to cover long distances in short intervals of time, and the silence of their march, are advantages susceptible of being utilized.

The cycling detachments of scouts and partisans, will generally be placed under the command of an officer who can ride.

Art. 9. The cycle-officer may, in some cases, and especially in staff service, be sent alone on special, important missions.

Chiefs of staff and regimental commanders should encourage the development of an exercise useful to the general welfare of the army.

Following this suggestion, they will see that everything proceeds regularly in accordance with the subscription system defined in articles 35 and 36 of these regulations.

Art. 10. In time of peace, the cyclist service is used in those fortresses where, because of the strength of the garrison, of the number and the importance of the services and of the great distances, cyclists can with advantage be substituted for foot and the mounted orderlies: These fortresses are designated by the corps commanders.

Art. 11. In time of war, the governors of fortresses and of intrenched camps, will have full authority to organize a cycling service for such places, according to the local resources and the existing needs. The same applies to commanding officers of coast sections and of halting places (*i. e.*, places where the troops are lodged), who will often find it advantageous to develop their means of communication and of obtaining information.

PART II.—ORGANIZATION OF THE CYCLE SERVICE IN THE ARMY.

Chapter I.—Effective Force.

Art. 12. In the field the number of cyclists of each staff, regiment or service corps, is fixed by the tables annexed to these regulations.

During the autumn manœuvres, the cyclist service is established on the same basis as in the field.

Art. 13. The number of men necessary to perform the cyclist service in the fortresses is determined by the corps commanders.

These men, taken from the reserve of the territorial army that have

the warrant of cyclists (Art. 20), are summoned by successive calls, and furnish their own machines.

Chapter II.—The Recruiting and Assignment of the Cyclists.

Art. 14. The cyclists are designated by the commanding generals of army corps according to the needs of the service, from among the men having obtained the warrant of cyclist, as the result of a special test.

Art. 15. The test is made, under the order of the commanding general of the army corps, in garrisons large enough to permit of the constitution of the examining board.

The board consists of three members: one captain and two lieutenants or sub-lieutenants. They are assisted by a surgeon. The members of the board and the surgeon are appointed by the commanding officer.

Art. 16. The tests are held habitually once a year. However, the corps commanders may increase or decrease the number of times the tests shall be held, according as the force of the cyclists is insufficient or more than sufficient.

No travel allowance is made to candidates; consequently it will generally be better to hold the tests during the periods of convocation of the reserve and the territorial armies.

Art. 17. Those who may take part in these tests are: Soldiers of the active army in the last year of their enlistment, and soldiers of the reserve and of the territorial army. Those present with the colors, address their application to their commanding officer; the others address their application to the officer in charge of the recruiting bureau in their domicile or place of residence.

Art. 18. To be admitted to the test the candidate should:

1st. Satisfy the board that he possesses the rudiments of reading, writing and arithmetic, and that he is able to make practical use of a road map;

2d. Be pronounced by the surgeon detailed on the board, physically qualified to use a bicycle.*

Art. 19. The test consists of a ride of 60 kilometres (37.2 miles) over fairly rough ground, executed in less than six hours, and on a bicycle furnished by the candidate. The board should satisfy itself, moreover, that the candidates are able to take apart and assemble the principal parts of their machines.

The board examines the applicants' "livrets" (soldiers' books), as well as any warrants or diplomas which they may have won in races, or got from various bicycle clubs.

*NOTE: The surgeon satisfies himself that, besides the general physical qualifications required in the order of May 13, 1894, the candidate possesses the following ones also:

Absolute soundness of the organs of respiration, a broad and well developed chest. Should show no affection of the heart; should not be subject to hernia; should present no signs of varicocele or of varicose veins; should not have any articular affection which may in any way interfere with the movements of the lower members; should be free from color blindness, possess a normal sight, at least in one eye and half normal sight in the other; correction with glasses will be allowed only in case of short-sighted men, and only to the extent of four dioptries.

Art. 20. The board states, by a mark between 0 and 20, which is not communicated to the candidates, its opinion of the merits of every one of them, considering their various qualifications (conduct, intelligence, training, technical mechanical knowledge, physical vigor, etc.), as well as of the rapidity of the riding test, bearing in mind the type and weight of the machine.

They eliminate the deficient candidates and make a list in order of merit of those whom they deem competent for the cyclist service.

The president of the board fills out, signs and gives at once, to every one of the last named a warrant in conformity with the model annexed to the present regulations; he enters the remark "Warranted Cyclist" in every soldier's book under the heading of "Instruction, stages et emplois spéciaux." The list of those warranted is transmitted to the general commanding the army corps, who forwards extracts therefrom to the commandants of the recruiting bureaux interested. The remark "Warranted Cyclist" is written on the inside of the cover of the soldier's hand-book, in the column "Observations," in the list of remarks.

Art. 21. The commanding generals of army corps, may delegate to general officers under their orders, all or a part of their powers, so far as regards their recruiting of the cyclists.

Art. 22. They regulate the assignment of the cyclists according to the needs of staffs, regiments, or services. Regimental and service commanders interested, and recruiting bureaux are informed of the assignments. Mention of the same is made in the hand-books of the soldiers.

Art. 23. Regimental cyclists are assigned to their regiments. Those of the staffs or service corps are assigned to the sections of secretaries of clerks and workmen, and of hospital attendants. In case these staffs or service corps are not stationed with the main part of said sections, the cyclists allotted them are numbered in these sections, but are mobilized by a troop unit of the garrison.

Art. 24. Cyclists, non-commissioned officers, keep their rank of corporal or of non-commissioned officer. However, sergeant-majors, first sergeants and quartermaster-sergeants, who would like to be detailed as cyclists, must be reduced to the grade of sergeant as soon as they are detailed.

"Adjutants" are not eligible as cyclists.

Art. 25. Cyclists are carried in their units in excess of war strength.

Chapter III.—Uniform, Equipment and Armament of the Cyclist.

Art. 26. The uniform of the cyclists of all the staffs, regiments and service corps includes the following articles:

- 1st. A cloth cloak with a hood, of the Alpine Chasseur model.
- 2d. A loose working jacket, of the Alpine Chasseur model, with the general symbol (velocipede) on the collar.

A cloth brassard, the same color as the ground of the blouse, with the special symbol and number (see the annex to these regulations); but-

tons and insignia of rank of the general model of those of the infantry.

3d. A jersey of the Alpine Chasseur model.

4th. Trousers made of red cloth, of the infantry model.

5th. A woollen belt of the Alpine Chasseur model.

6th. A cap of the infantry model.

The cyclists of the battalions of foot-chasseurs retain the buttons and insignia of grade, as well as the trousers and the head-gear of their corps.

Art. 27. The cyclists are provided with the regulation underclothes. However, they carry also an extra cravat, and their shirts are made of cotton flannel with collars.

Art. 28. Every cyclist is provided with two pair of regulation shoes of the model called "rest," and with a pair of canvas water-proof leggins.

Art. 29. The equipment comprises :

1st. A ration bag of the regulation model.

2d. A pouch for despatches.

3d. A cartridge box, of the cavalry model, held up by a leather belt.

4th. The small canteen with the drinking cup attached.

5th. The haversack, of the regulation model for foot soldiers; this article is carried on the machine.

Art. 30. The arms consist of the cavalry carbine, model 1890. It is protected by a leather boot fastened to the machine. The ammunition consists of eighteen cartridges.

Art. 31. The preceding regulations relative to the uniform, equipment and armament, apply only to soldiers definitely assigned as cyclists and summoned for the fall manœuvres, or in case of the mobilization. In all other cases, the soldiers employed as cyclists, retain the uniform of their corps; they ride without arms and, in the mounted troops, make use of the cavalry trousers without false boots and of the infantry shoe.

Chapter IV.—Material.

Art. 32. The kind of machine used in the army is a "roadster," the model of which is determined by the Minister of War upon the recommendation of the Artillery Department. The regulation machines are constructed under the supervision of that arm of the service.

Art. 33. The machines furnished gratis by the government (Art. 3), are distributed in the ratio of :

Two to each regiment of infantry, of engineers, of artillery, and to each battalion forming a separate command (those of the African light infantry excepted); one to each regiment of cavalry and to each squadron of the train.

Art. 34. The machines furnished non-gratis by the government (Art. 3) are furnished under the following conditions :

Regiments are authorized to purchase from the Artillery Department, on account of the harness and shoeing fund, a certain number of bicycles. The requests after examination and signature by the sub-intendant

charged with the supervision of the fund, are taken up by the corps commanders and forwarded to the Minister of War, who acts upon the same.

The money-value of the bicycles acquired by the regiments is refunded to the Artillery Department (according to a tariff fixed by the Minister of War) by means of a deposit with the Treasury.

Regiments recover their advances according to the installment system for officers, defined in the next article.

Art. 35. Officers and those of assimilated rank are authorized to secure bicycles by subscription. This subscription not to be taken for less than three months. The delivery of bicycles to officers serving with troops is authorized by the regimental commander.

Staff officers, officers on duty without troops, and persons of assimilated rank, wishing to obtain bicycles by subscription, should make application to regimental commanders. The subscription price, paid at the rate of 9 francs per month, is turned in to the harness and shoeing fund of the regiment furnishing the machines. If the officer belong to the regiment this payment is made directly and every month by the paymaster by means of a stoppage against his pay. If the officer do not belong to the regiment, he makes a payment every three months to the Treasury; this payment is covered into the fund. Payments are made when due.

Art. 36. The bicycle subscription made by officers ceases to operate when the bicycles are employed by their regiment in fall manoeuvres, or are called in on mobilization. In the case of a change of station requiring at least 15 days, the officer is at liberty either to keep or to give up his subscription. When the subscription is interrupted, the amount to be charged against the officer is calculated at the rate of 0.3 fr. a day, the time that the machine was placed entirely at his disposal.

Art. 37. Officers are authorized to ride in uniform.

Art. 38. In case of mobilization all the bicycles furnished by the government either gratis or non-gratis, are used to make up the cyclist service. Corps commanders may take machines which are in excess of the regulation number in any regiment and give them to one having a deficiency. The machines thus obtained have a money value put on them, their deterioration being taken into account, and the resulting amounts are refunded to the regiment by the State.

Art. 39. Cyclists summoned for garrison duty, in conformity with the conditions of Article 13, are required to furnish a machine of the "roadster" or "semi-roadster" type, as well as the accessories and the necessary spare parts. Upon their arrival these machines are examined, and to avoid all subsequent disputes, are appraised by a board appointed for that purpose by the commanding officer. This board consists of two officers and one chief armorer. When the machine is not deemed fit to rendering good service, the summons of the man as cyclist is annulled and he takes his training at the normal epoch of the class to which he belongs, and under the usual conditions.

Art. 40. In time of war bicycles belonging to individuals are, if necessary, requisitioned, in conformity with the provisions of Art. 17 of the decree of August 2, 1877.

Chapter V.—Administration ; Pay ; Repairs ; Condemnation.

Art. 41. In garrison, cyclists summoned in conformity with the conditions of Article 13, receive the pay of their grade.

In the fall manoeuvres and in the field, the cyclists assigned to the staffs and services are entitled to a daily allowance, the same for all grades, of 2.5 fr., to the exclusion of all other allowances. Regimental cyclists are entitled, as a rule, only to their pay and live at the soldiers' mess ; exceptionally, and on the order of the commanding officer, they are allowed 2.5 fr. per day, exclusive of all other allowances.

The daily allowances of 2.5 fr. are charged to the account of travel allowances. Commanding officers may give cyclists a certain number of requisition orders for a half-day's food from civilians.

Art. 42. Regiments are responsible, as stated in Articles 43, 44, 45, for the care and repair of the bicycles they keep, either gratis or non-gratis. The repairs of these bicycles are made according to their importance, either by the chief armorers or by the Artillery Department, at rates fixed by the Minister of War.

In time of peace the repairs to be made by the Artillery Department, are authorized only by the Minister of War ; the amount is reimbursed, by a payment into the Treasury, to the service which bears the expense of transportation.

Art. 43. Regiments must themselves meet the expenses incident to the care and repairs :

1. Of the bicycles they keep gratis ;
2. Of the bicycles they keep non-gratis, while they are used in the fall manoeuvres.

These expenditures are borne by the harness and shoeing fund.

Art. 44. There are allowed to this fund :

1. A daily bounty of .07 fr. for every bicycle held gratis. This bounty is increased from .07 fr. to .05 fr. while the bicycles are being used in the fall manoeuvres.
2. A daily bounty of .05 fr. for every bicycle held non-gratis, during the entire time that the bicycles are used by the regiments in the fall manoeuvres.

Art. 45. Officers holding regulation bicycles by subscription are charged with their care and repair. The repairs are made on the conditions and at the rate stated above (Art. 42). The expenditure is made from the harness and shoeing fund and is refunded to that account by the officer.

Art. 46. Cyclists summoned for garrison duty (Art. 13) are entitled to a daily allowance of .6 fr. for the use and care of their machines. Besides, extensive repairs resulting from serious injury, officially established, are made at the expense of the government.

Allowances for wear and maintenance are paid on account of the pay appropriation, and are entered in a special column of the daily allowance and pay sheet of the unit to which the soldier belongs.

Art. 47. The condemnation of bicycles in use, either gratis or non-gratis, is decreed by the Minister of War upon the recommendation of the inspectors general.

PART III.—TEMPORARY REGULATIONS.

Art. 48. Until the number of regulation bicycles required by the total strength of the army can be supplied cyclists will be required to furnish for the fall manœuvres, and in case of mobilization, their own machines, as well as the accessories and the necessary spare parts.

Art. 49. The provisions of Articles 39 and 46 apply to cyclists summoned with their machines for the fall manœuvres; however, the daily allowance for wear and maintenance of the machine is increased to 1 franc.

Art. 50. Cyclists summoned with their machines in case of mobilization (Art. 48) are paid as indicated in Article 41.

Their machines are examined, registered and appraised by the board mentioned in Article 39; then requisitioned according to Art. 17 of the decree of August 2, 1877; consequently, the cyclist receives in the field no special allowance for the care and repair of the machine, these being at the charge of the government.

When the cyclist takes possession of his machine again, the allowance for wear and tear is paid on the basis of the appraisal made by the aforesaid board.

Table showing the number of cyclists allowed each staff, troop unit or service :

Headquarters of an Army Corps.

Troop Unit or Service.	Number of Cyclists.
The Staff of an Army Corps	8
General commanding the artillery of an Army Corps	2
Colonel commanding the engineers of an Army Corps	1
" Direction " of the services of the military intendance	2
" Direction " of the Medical Department	1
Pay and Post-office of an Army Corps	3
Telegraphic section in the first line	2

Headquarters of an Infantry Division.

Staff of the Division	4
Staff of the Divisional Artillery	2
Administrative Services	2
" Direction " of the Medical Department	1
Pay and Post-office	2

CYCLIST SERVICE IN THE FRENCH ARMY. 493

Headquarters of an Independent Cavalry Division.

Staff of the Division	4
Commanding Officer of the Divisional Artillery	1
Sub-intendant of the Division	1
Pay and Post-office	2
Staff of an Infantry brigade	2
Staff of a Cavalry brigade	2
Regiment of Infantry	4
Battalion of Chasseurs	3
Divisional company of Engineers	1
Regiment of Cavalry	2
Commanding Officer of the corps artillery of an Army Corps	2
Staff of the Artillery park	2
Headquarters field-hospital	1
Divisional field-hospital	1
Field hospital of a Cavalry division	1
Field bakery	1

NOTE.—The number of men here indicated is reproduced in the table of war strength with the remark that they are in excess of the strength of the troop units.

The number of cyclists allowed the staffs of the army corps and of the divisions has been so figured that they might be used by the various services of the headquarters, when special circumstances render inadequate the number of cyclists attached to those services.

————— Army Corps.

Place

CYCLIST'S WARRANT.

The President of the Board of Cycling Tests certifies that (grade, name and forenames). has qualified in the test in which he took part at on the . . . day of 189 .

Therefore (grade and name)., is declared "Warranted Cyclist."

At, on the . . . day of . . ., 189 .

President of the Board.

NOTE.—A monotonous and detailed description of the uniforms, symbols, etc., worn by the cyclists belonging to different branches of the service is omitted; also, tables giving the rates of repairs and the prices of the various parts of the machine.—Translator.

I. GENERAL PRINCIPLES.

Use of the Projectiles.—In an article devoted to the Spanish artillery, the *Revue* has already given* a description of the projectiles and of their effects.

From the knowledge of these effects are derived the following rules for the employment of each kind of projectiles :

1. Ordinary shell fire is used against troops sheltered behind thin walls ; it is destined to shoot away the tops of parapets, consequently to uncover their defenders, as much as possible and even to breach obstacles of slight resistance and of little depth.

Ordinary shells are also employed sometimes in finding the fork, their relatively heavy charge facilitating the observation of the points of fall.

Finally, on account of the rapidity with which the range may be got, this kind of fire may also be employed against movable objects.

2. Shrapnel fire is particularly efficacious against animated objects, and, as field artillery is employed almost exclusively against objectives of this nature, this kind of fire is the general rule.

It is employed against troops in the open or under cover, provided that, in the latter case, they present a certain vulnerable surface.

3. Canister fire is employed at distances less than 300 metres.

The useful effect of this kind of fire varies with the form and the character of the ground ; but it is always deadly, notwithstanding the very unfavorable conditions under which the pointing is effected.

For ranges comprised between 700 m. and 300 m., the Spanish artillery uses shrapnel with the fuse cut at zero, which produces at these distances as much effect as canister does at distances under 300 m.

OBSERVATION OF THE SHOTS.

Principles of the observation of the shots.—Since the accurate pointing of the piece depends upon the observation of the shots, the Manual insists at great length upon the necessity of possessing a good system of observation.

In order to avoid doubt and error as much as possible, the captain, while endeavoring to observe the shots either with the naked eye or by means of a field glass, completes his own observations by those of an auxiliary personnel, selected and instructed with the greatest care.

The duty of this personnel is to observe :

1. The position of the points of fall or of burst with reference to the target ;

2. The effects produced on the target by the projectiles ;

3. Any discontinuance of the enemy's fire.

Organization of the service of observation.—This service is generally performed by a corporal or a sergeant, in charge, and two cannoneers, observers.

* *Revue d'Artillerie*, Vol. 50, April, 1897, and July, 1897.

The chief of observation, provided with a telescope, is posted near the captain and endeavors particularly to observe errors in direction, heights of burst and the effects produced on the objective; he invites the attention of the captain to this last point whenever he deems it necessary to do so, while conforming to the previous instructions that he has received. He indicates the position of the points of fall and of time-bursts only when directed to do so by the captain.

If the telescope is provided with a micrometrical scale, the chief of observation may occasionally utilize it, by order of the captain, for measuring the distance of the target, the heights of burst or the errors in direction; but, on account of the consequent slowness of ranging, this method is not recommended.

The cannoneer-observers are posted laterally and, when practicable, on opposite sides of the battery.

Their rôle consists entirely in estimating errors of range, without paying any attention to errors of direction or of heights of burst.

It is habitually sought to conceal each post of observation from the view of the other post; but it is essential that both posts command the ground in front and in rear of the object and that they be in view of the battery commander.

The cannoneer-observers communicate with the battery by means of a special flag, which they carry attached to the belt.*

The captain observes the shots directly, then immediately looks towards the lateral observers, whose indications serve to confirm or to cause him to doubt, his personal observation; he rounds out this information by referring, when necessary, to the chief of observation.

The comparison of the different observations must be made very rapidly. The experience and the judgment of the captain should enable him to avoid all hesitation on this subject; whenever this comparison establishes a serious discrepancy, the explanation of which would be difficult to obtain without loss of time, the observation will be declared doubtful. Special attention must be paid to the observations for determining the bracket.

When, in exceptional cases, the points of fall of neither shorts nor overs are seen, the observation will be confined to a statement of the effects produced upon the object; in such cases, the observer at the telescope furnishes the best data for the execution of the fire.

Each battery commander organizes his service of observation. Within the limits that he may deem expedient and depending upon the practical instruction of his personnel, the regulations allow him to depart from the general rules; the less his confidence in his own powers of observation, the greater the care he must exercise in the organization of this service.

Training of the observers.—Immediately after their arrival, all recruits are subjected to an examination that has for its object the determination

* *Revue d'Artillerie*, Vol. 50, July, 1897.

of their visual acuteness and that consists in measuring the distances at which they can distinguish the colors of a certain number of pennants.

The results obtained generally show that in each battery two or three men have defective vision, that the great majority of the recruits possess good eye-sight and that one or two men are endowed with exceptional powers of vision. The men of this last category are selected for training as observers.

This instruction is given in all the necessary details by the captain himself, assisted by all his officers. It consists of target practice, in which the observers record upon tablets or transmit by signals their observations relative to the position of the point of burst with respect to the target.

In these exercises, especial emphasis is laid upon the difficulties arising from the configuration of the ground, once the latter becomes undulating.

Attention is called with the greatest minuteness to the manner in which successive crests project themselves upon one another and to the most frequent errors that the observers are likely to commit in each particular case.

For each exercise in observation, a list is prepared, according to which the modulus of observation of each observer is computed, that is, the ratio between the number of accurate observations and the total number of observations. The men are classified according to their modulus of observation and appointed observers, as vacancies occur, in the order of their classification.

The foregoing exercises are not intended solely to instruct and to classify the personnel of observation; in addition, they enable the captain to compare his own judgment with that of this personnel and consequently to find as reliable a basis as possible for the observation of the fire.

INDIRECT LAYING.

Practice in indirect aiming forms an important part of the instruction of the Spanish artillery.

The Manual lays down the principle that during the reconnaissance the captain is not to concern himself with ascertaining whether aiming with the rear sight is possible for all the pieces; it is sufficient that he himself see the target either by remaining mounted or by ascending some natural or artificial elevation in the immediate vicinity of the battery. This condition assumed, the firing must be executed with the same rapidity, whatever be the method of laying employed.

The apparatus in use for indirect aiming consists of an auxiliary front sight and peep-sight, and of a sighting-rod. This apparatus having been already described in the *Revue*,* the present article will be confined to a completion of this description by an account of the processes relating to its employment.

* *Revue d'Artillerie*, Vol. 50, July, 1897.

Laying with the sighting-rod.—To use the rod in laying, set it up vertically 10 paces in front of the muzzle or 10 paces in rear of the breech, in such a way that its axis shall lie in the plane of sight, then raise or lower the vane of the stake until the lower vertex of the open triangle coincides with the point of the front sight or of the auxiliary front sight, as the case may be.

This coincidence, established at first approximately, is afterwards obtained with exactness by fixing the vane to its rod with the thumb-screw, and then by slightly displacing the head of the rod by means of the sleeve or by striking it lightly with a mallet.

When the piece to be laid by reference is pointed in direction only, it is necessary, before determining the height of the sight-vane, to set the rear sight at zero and to bring the axis of the piece into a horizontal position by means of the level.

Whenever the piece is laid with the sighting-rod, the point of the right wheel in contact with the ground is marked with a forked picket, one of the points being placed against the rim of the wheel.

Initial pointing of a piece.—The processes employed in giving the initial pointing to a piece consist in alignments either on the target or on auxiliary bench-marks situated to the right or to the left, in front or in rear of the piece. In the exceptional cases in which none of these methods can be employed, the pieces are laid by the eye in the direction of the object.

Initial pointing of several pieces.—The concordance of the pointing of the various pieces is obtained in three different ways:

Converging lines of sight.—The method preferred consists in pointing the pieces directly upon an auxiliary target situated in front of the battery and nearer to the target than to the pieces.

However, if the target is visible from an elevated point situated a short distance in front or in rear of the pieces, the system of alignments is employed.

Diverging lines of sight.—If, these methods failing, there should be in rear of the battery and approximately in line with the target a distant point on which one may aim directly, the lines of sight are inversely directed upon this point.

The first shots of the extreme lateral pieces indicate which line of sight approaches most nearly to the objective and serve to determine the proper corrections for deflection.

Parallel lines of sight.—If no one of these methods is applicable, one piece is pointed in the supposed direction of the target and is aimed by the use of the sighting-rod. The bearings of the other pieces are determined by means of a cord forming a parallelogram, of which the length is 10 metres and the width the normal interval between pieces. This method of pointing is executed in the following manner:

A vertex of the parallelogram being fixed at the picket *a* of the first piece (see figure on page 12, *Revue d'Artillerie*, October, 1897), the sight-

ing-rod is placed at the point b , 10 metres distant from the picket a . The stake at b is then moved through an arc having a for a centre and 10 metres for a radius, until it comes into the prolongation of the line of sight at c , where it is driven into the ground. The picket of the adjacent piece is next placed at the angle a' and is then changed in position, the cord being kept taut, until the most favorable emplacement for the piece is found, and is there driven into the ground. The fourth vertex c' indicates the point at which the second sighting-rod is to be set. The other pieces and their corresponding sighting-rods are placed in a similar manner. All the pieces are thus oriented on parallel lines with an approximation sufficient for the direction of the fire. In laying by this method, careful attention must be paid to the setting of the sighting-rods, with a view of having them exactly vertical.

Lines of sight directed upon an auxiliary target situated in front or in rear of the battery may also be considered as parallel when the pieces occupy a narrow front and the auxiliary target is at a great distance from the battery.

When the initial pointing is effected by means of an auxiliary target situated at a short distance from the battery, it is necessary to point each piece separately in direction, after having brought all the pieces into a horizontal position in order to determine the height of the vanes on the rods.

CHOICE OF POSITION.

The Manual defines as follows the principles to be observed in the choice of position as well as the direction to be given to the instruction of the troops.

In order to estimate the advantages and the defects of a position, one must go back to the fundamental principles that serve as a basis for artillery tactics; but local circumstances exercise a preponderating influence in the question, and it is as difficult to unite in the same position all the advantages as it is to eliminate all the defects.

The advantages consist either in augmenting the efficacy of one's own fire, or in attenuating the effects of that of the adversary. Both of these conditions are very important, but it is the first that must always be considered before the second.

However, as positions must always be subordinated to the general situation of the troops in the combat, and, above all, chosen with great rapidity and without any hesitation, batteries must be instructed in such a way as to be able to fire in all cases and in all positions.

II. RULES OF FIRE.

Preliminary Consideration.—Ranges are classified as follows:

Up to 1500 metres, short;

From 1500 to 2500 metres, medium;

Beyond 2500 metres, long.

The firing battery is composed of two sections of three pieces each.

Unless otherwise ordered the firing, during ranging, is executed in isolated batteries by salvos of two pieces (the 1st, 2d or 3d of each section) and, in groups of two or more batteries, by section salvos. First piece to fire does so by the captain's command; the second piece opens as soon as the detonation of the first is heard. By extension of the same rule, in firing by group, the third piece is fired at the moment of the discharge of the preceding piece.

The regulation of the fire in range is generally based upon the proportion of shorts; it is based upon the proportion of overs only in exceptional cases in which the latter can be better observed than the former.

The regulation of the time of flight is based upon the ratio of the percussion shots to the time shots.* Corrections are made by means of a scale with which each gunner is provided and which is similar to our scale of correspondence between elevation and fuse-cutting.†

The rules of fire are generally applicable to the fire of a single battery only. In group-firing each battery must conform to these rules; however, the same rules may in certain cases be applied to the group as if it formed but a single battery.

The Manual in addition lays down the principle that, while the indications it gives must constitute the basis for the execution of the fire, yet the knowledge of the details required to complete them can be acquired only by experience.

To the written precepts, the captain must consequently add the remarks suggested to him by his own experience.

PRACTICE AT A FIXED TARGET.—PERCUSSION FIRE.

Summary of the method :

1. Enclose the target, first in a long bracket of 100, 200, or 400 metres, according to the distance, then in a short bracket of 50 metres.
2. Correct the rear sight by firing a series of six rounds each, commencing with the inferior limit of the short bracket.

Bracket.—The captain, using elevations varying from one another by an amount corresponding to the long bracket, first encloses the target between two salvos. The limits of the long bracket are, 100 metres for the short, 200 metres for the medium and 400 metres for the long ranges.

The captain then reduces the amplitude of the long bracket, by successive means, until he embraces the target in a short bracket, that is to say, between two salvos differing in elevation by 50 metres.

If the same salvo gives one shot short and one shot long, or if a hit is undoubtedly observed—the corresponding elevation is immediately adopted as the inferior limit of the short bracket.

* These terms do not here refer to the kind of fuse employed. For the sake of brevity, a shell bursting after attaining the point of impact is designated "percussion"; and when bursting before reaching that point, "time."—F. W. H.

† *Revue d'Artillerie*, Vol. 50, July, 1897, p. 407.

Series.—The series firing is begun with an elevation corresponding to the short limit of the small fork.

The fire is considered regulated when in a series of six rounds the ratio of shorts obtained is from $\frac{1}{4}$ to $\frac{3}{4}$.

If the first salvo gives two shorts, a new series is immediately begun, the distance being augmented by 25 metres; if the first two salvos give overs only, a new series is begun, the distance being diminished by 25 metres; if in an entire series but one short or but one over is obtained, a new series is fired, the distance being diminished or increased by this same quantity—25 metres.

In all other cases, the range is considered as definitely obtained. The fire is then executed by piece, with the same elevation, at the commands of the chiefs of section.

Remarks.—In order to shorten the time required for establishing the bracket, it is recommended to adopt the following method: At the moment the captain gives the distance for the salvo of the first two pieces, the elevations of the other pieces are so echeloned that, whatever be the result obtained by the first salvo, there will always be two pieces laid for the second salvo.

In getting the bracket, the result of a salvo comprising a doubtful shot is assumed to be the same as that obtained from the other shot.

In the execution of the fire by series, one does not complete the series comprising but one doubtful shot; if there are two doubtful shots, a supplementary salvo is fired; if there are more than two doubtful shots, two more salvos are fired or else the series is repeated, having recourse, if necessary, to the rules given hereafter for cases in which the observation is difficult.

FIRING WITH TIME FUSES.

Summary of the method:

1. Enclose the target, by means of percussion shells, within a bracket of 100 metres.
2. Correct the rear sight and regulate the time of flight at the same time by means of series of six rounds each, beginning with the inferior limit of the 100 metre-bracket.
3. Verify the rear sight by increasing the distance 100 metres and by firing a series with the new elevation.

Bracket.—The process of getting the bracket is the same as in the fire with percussion shells and is continued until the target is enclosed within two distances differing by 100 metres or between two shots of the same salvo.

Series.—The starting point for the fire of a series is the elevation of the salvo that has enclosed the target, or else the inferior limit of the last bracket.

Whenever an over, either percussion or time, is observed, the distance is diminished by 50 metres; if two percussion shorts are observed,

the slide of the time scale is lowered one division ; if the six shots of the series are short and time, this slide is elevated one division.

The range is considered obtained when a series gives six short, of which one is percussion and five are time.

Verification of the range.—To verify the range thus obtained, increase this range by 100 metres and then execute a fire by series, with the elevation and time corresponding to the new range, until one over, percussion or time, is observed ; when this result is obtained, the range of the first series is considered as verified.

If one of the series of ranging shots gives any overs, either percussion or time, it is not necessary to verify the range.

If the bracket is exact, the verification of the range, after the regulation of the height of burst, should always be obtained by a single increase of the distance by 100 metres ; but if, notwithstanding this increase, a short series is obtained, the distance is again increased by 100 metres, and the firing is continued until a number of overs are obtained ; when this result is obtained, the distance of the preceding series is adopted.

Remarks.—In firing against troops under cover, aiming at the crest of the obstacle, the ratio of percussion shots to be obtained in the regulated fire is two in a series of six.

Very low time shots, the point of burst being less than one metre from the ground, are considered as percussion shots in the regulation of the height of burst.

In firing at the top of a wall or against a target on the top of a hill, all time rounds that are projected against the wall or the hill must be considered as percussion rounds.

To pass from shell to shrapnel fire and *vice versa*, it is necessary again to enclose the target with the new projectile, changing the distance by 100 metres at a time in the first case and by 50 metres in the second. As soon as the short bracket is thus obtained the fire by series is executed.

FIRE WITH COMBINED ELEVATIONS (TIR ÉCHELONNÉ).

This kind of fire will be employed :

1. At short ranges, when the artillery finds itself within the effective range of the infantry rifle ;
2. When the observation is difficult ;
3. When the enemy is very much scattered ;
4. When all the projectiles available are provided with time fuses only.

The Manual states furthermore that in shrapnel fire, even with combination fuses, it will frequently be very advantageous to echelon the rear sights of the sections in order to arrive rapidly at the proper elevation for the distance of the target. As a general rule, in firing with combined elevations, the endeavor is made at the outset to enclose the

target by means of percussion shots, within a bracket of which the amplitude is afterwards to be diminished as much as possible; then immediately echelon the fire by passing to time fire, if necessary, and by adopting for one section the elevation corresponding to the superior limit of the bracket and for the other section that corresponding to the inferior limit. The fire is then executed by piece at the command of the chief of section, who modifies, in the time fire, the height of burst corresponding to his distance until he has obtained one percussion shot in a series of six shots.

The captain follows attentively the progress of the fire, observing the effect of the shots fired with each elevation, in order to unify these elevations or to substitute for them, others greater or less.

When only time fuses are available these are set on opening fire and section salvos are fired until the target is enclosed between two salvos differing in elevation by 200 metres. The firing is then continued with combined elevations, the first section using the elevation corresponding to the short salvo and the second section using this elevation increased by 50 metres.

If necessary, the captain next causes the firing to be executed with changes of 100 metres at a time in each of these elevations, until the lower elevation gives nothing but shorts and the higher elevation a few overs. When this result is obtained, he adopts for both sections the lower of the two elevations.

In short range shrapnel fire, no effort will be made to diminish the space between the limits of the brackets; the combination of elevations is effected, as soon as the bracket of 400 metres is obtained, by giving to the first section the elevation corresponding to the inferior limit of the bracket, to the second this elevation augmented by 100 metres or 50 metres and by commencing immediately the time fire. The object of this is to act as rapidly as possible when the battery finds itself engaged in the zone in which the infantry and shrapnel fire of the enemy possesses a great efficacy.

On the other hand, when a combination of elevations is rendered necessary by the difficulties of observation, the captain seeks to reduce as much as possible the zone embraced by the limits of the brackets and then fires with two combined elevations differing by 100 metres or 50 metres, according to the amplitude of the brackets.

When the enemy is greatly dispersed over a considerable stretch of ground, and the object of the distribution of the fire in depth is to cover uniformly a definite part of the ground occupied by the objective, the Manual states that it will be very difficult to obtain the desired result with a single battery using a combination of two elevations; it will then be necessary to have two or more batteries firing with a combination of three elevations.

DISTRIBUTION OF THE FIRE.

In getting the bracket, all the pieces are aimed at the same point,

which is, in general and without any indication to the contrary, the middle point of the foot of the target.

If the front of the objective exceeds 30 metres, the fire should be distributed by section or by piece, according to the indications of the captain, at the moment of commencing the fire by series.

The broadest front that can be effectively swept by one battery, the fire being directed upon three or six points, is estimated at 100 metres.

PRACTICE ON A MOVABLE TARGET.

Summary of the method :

1. Enclose the target within a bracket whose amplitude depends upon the celerity attributed to the objective.
2. Regulate the fire on the limit of the enclosing zone towards which the target is moving and execute a slow fire.
3. As soon as a shot is observed near the object, execute a rapid fire until the objective moves out of the dangerous zone.
4. Change the distance by successive gradations of 200 metres and fire under the same conditions as before with each of the elevations thus obtained.

The captain encloses the target within a bracket whose amplitude depends upon the rapidity and the direction of motion of the objective. When this movement takes place in the direction of the line of fire, this amplitude is 200 metres against infantry and 400 metres against cavalry at a trot. In proportion as the objective diverges from this direction, the amplitude of the fork must be progressively diminished to the limit of 50 metres which corresponds to the case in which the objective moves perpendicularly to the line of fire.

When the bracket has been established, a slow fire is directed upon the limit toward which the target is advancing ; as soon as a shot is observed near the target, the greatest possible rapidity is given to the fire until the objective quits the dangerous zone. At this moment, the elevation is diminished or increased by 200 metres according to the direction of motion, and the objective is again waited for, while executing a slow fire, which is converted as before into a rapid fire at the opportune moment.

In time fire, the period of slow fire is utilized for regulating the height of burst.

Special cases.—When shrapnel fire is used against an objective marching toward the battery, the elevation is diminished by 100 metres instead of by 200 metres at the moment of observing that some of the shots are overs and the rapid fire is continued ; the object when moving away from the battery is assumed to be entering the dangerous zone at the moment in which no more overs are observed.

The method indicated above for firing against a movable target is not employed when the objective must pass certain determined points ; in this case, the fire is regulated upon these points and a rapid fire is ordered at the moment the objectives reach them.

In the case of a close attack, shrapnel with fuses cut at zero is used at distances comprised between 700 and 300 metres and canister at distances under 300 metres.

If, during shrapnel fire, the enemy's cavalry makes an unexpected attack, the loaded pieces are directed upon the new objective, the shrapnel then acting as percussion shells; for the pieces not loaded the fuses are cut at zero and the projectiles found near these pieces at this moment are fired; immediately afterwards, canister fire is begun.

Whenever a battery may expect a close and sudden attack, six rounds of canister should be placed beforehand on the ground near each piece.

PRACTICE AGAINST A MASKED TARGET.

Indirect Laying.—When the objective is not visible to the gunners on account of the defilement of the battery, the laying is said to be indirect. In this case, the initial pointing is given to the pieces either by means of an auxiliary point or by one of the methods of indirect pointing already described. The preliminary pointing having been obtained, the final pointing in elevation and direction is made by means of the sighting-rods, the latter being placed whenever possible in rear.

The captain is responsible for corrections in direction. After the first salvo, he orders for all the pieces a correction in deflection double that which he judges necessary, in order to bring the second salvo on the other side of the target; if he does not obtain this result, he makes new and general corrections on the same principle until he has forked the object in direction; for the following salvo, he then takes the mean of the last two liberal sight allowances.

When the points of fall are brought into the space immediately surrounding the object, the pointing in direction is continued separately for each piece.

The regulation in range is executed conformably to the rules established for firing with direct pointing, but the fire must not be distributed nor time fire commenced before terminating the general correction of the errors in direction.

Indirect pointing may be employed for firing against a fixed object as well as for firing against a movable object; if the captain can see the target and observe the effect of the shots, fire with indirect aim should have the same efficacy as that with direct.

If, on the contrary, the relief of the cover and its proximity to the objective prevent a direct observation of the results of the fire from the position of the battery, it is necessary—since the captain must never withdraw from the pieces to such a distance that he can no longer command them directly—to have recourse to the signals of an observer or else to fire at the crest of the obstacle and echelon the fire beyond this crest; but, under such conditions, it is generally preferable not to fire.

NIGHT FIRING.

In night firing, the same methods that are employed for firing by day are adopted without modification.

If night firing succeeds a previous firing by day, the guns are laid by means of sighting-stakes dimly lighted by dark lanterns.

If it is already night when the firing is commenced, the pieces are pointed directly at the object at the moment at which the latter is revealed either by its own aspect or by the flash of its discharges, or an auxiliary aiming point is sought. The initial pointing having been obtained, the final pointing is effected by means of sighting-rods.

INDIRECT FIRE.

The fire is called indirect when there exists between the battery and the objective an obstacle high enough to intercept the mean trajectory directed upon the object.

For indirect fire with the 8 cm. and 9 cm. guns, the charge is reduced to the half of the normal charge.

This fire is employed when it is desired to obtain a greater angle of fall in order to reach troops under cover; but as an angle of the same value may be obtained, without renouncing direct fire, by an augmentation of the distance, thus retaining a greater precision and a higher remaining velocity, it is recommended, whenever possible, to withdraw from the object rather than to reduce the charge.

The Manual remarks moreover that field-guns are little adapted to firing under great angles of elevation; it advises, in such cases, that shell precede shrapnel fire in order to demolish, to a certain extent, the crest of the covering mass.

GROUP FIRING.

The Manual lays down the principle that the battery is the firing unit, and the group the combat unit; it deduces from this principle that there exist in reality no special rules for group firing, and that each battery must apply individually, according to the conditions presented, the rules given in the preceding paragraphs.

Ranging.—The batteries of the group must assist one another during ranging; the first to find the range informs the others of its measure. In certain cases, it will be necessary to proceed to ranging as if the entire group constituted but a single battery.

In order to establish under all circumstances the combination that admits of the greatest possible rapidity in ranging, the Manual distinguishes between the two cases of the successive and the simultaneous arrival of the batteries on the position.

First Case.—When the first battery arrives on the position, its captain, after having had his part of the objective indicated to him, immediately opens fire. As the other batteries arrive, he indicates to them the range at which they are to open fire, and the progress made in ranging. These other batteries continue the ranging from this point, taking into account, if necessary, the distance of their echelons from the first battery.

As soon as one of the first batteries has terminated its ranging, the com-

mander of the group transmits to the others the data of the regulated fire. He assures the division of the objective and indicates the kind of projectiles to be employed.

The other ranging operations are executed in general as in the case of an isolated battery.

Second Case.—If the objective is of sufficient extent to be divided into sections, each battery effects its regulation independently of the others until the commander of the group deems it opportune to order the concentration of the fire on a determined point; if one of the batteries regulates its fire before the others, he orders the latter to use the elevation of this battery, taking into account, if necessary, the relative distances of their echelons.

It is often advantageous to cause the first ranging shots to be fired by a single battery.

It is sufficient, for a division of the objective, that the latter have a width of from 10 to 15 metres per battery, according to the range.

When the batteries are grouped under favorable conditions, and when it is impossible to designate for each one of them a distinct point of the objective, enabling it to effect independently the regulation of the fire, the commander of the group assumes the direction of the fire; the firing, however, is executed at the command of the captains.

The first battery of the group takes the elevation corresponding to the estimated distance; the second, the elevation indicated by the Manual for the case in which the preceding range is short; the third, the elevation indicated by the Manual for the case in which the preceding range is long.

The fire having been opened by section or battery salvos, the commander causes the second or third battery to fire, according to the result obtained by the first salvo. The other batteries continue their preparations for the following salvos by taking the elevations indicated by the Manual, the nearest battery (or that on the right of the battery firing) adopting the elevation that corresponds to a salvo falling short and the other battery the elevation that corresponds to a salvo falling long. The commander of the group thus has in every case, a battery pointed with the desired elevation.

The captains attentively follow the ranging, and when they see that by reason of the elevation they have adopted, their turn to fire has come, they indicate the fact in a loud voice and then turn toward the commander of the group in order that the latter may give them the signal to fire.

For the direction of the fire, the commander of the group may place himself on an observatory very close to the batteries, whence he transmits his orders by means of conventional trumpet signals.

The fire having been regulated, the batteries continue firing separately by section salvos. The heights of burst are always regulated by the captains. The first ranging salvos are fired by sections only, if

there is any doubt concerning the estimated distance, or if it is not desired to expend too much ammunition.

When the position of one of the batteries is concealed from the view of the enemy, it is well, at first, to bring this battery alone up to the position and to cause it to fire with indirect laying until the range is got; as soon as this result is obtained, the other batteries are deployed and they immediately commence firing with direct aim and with the elevation already obtained.

Firing with Combined Elevations.—When the depth of the target necessitates the use of a combination of three elevations, the direction of the fire is also incumbent on the commander of the group.

In this case, this officer first encloses the objective between two sections or battery salvos, then echelons the fire of the batteries between the two limits of the fork and finally brings these limits closer together, proceeding by gradations of from 25 to 50 metres in percussion firing and of from 50 to 100 metres in time firing.

Firing on a Moving Target.—Against a moving target, it is often advantageous immediately to echelon the pointing of the batteries in range and in direction.

The commander of the group observes the first shots and orders the relative changes in elevation and in direction until he has brought the points of fall into the zone of the target, then he allows the captains to follow the objective with their fire at their discretion.

Remarks.—As in the fire of isolated batteries, the officer directing the fire has full latitude in the utilization of his knowledge and experience. On this subject the Manual reads as follows:

“As the incidents of a combat are very numerous and as, consequently, situations different from those provided for by the Manual will frequently present themselves, the commander of a group must act in every case according to his own inspiration and must exercise his practical knowledge and his experience to the best advantage.

“He must never go into details nor disturb or distract the attention of the captains because some particular shot has been badly directed. If, however, after the observation of a certain number of shots, he judges that one or several batteries are firing too long or too short, or that the rapidity of the fire is not within the limits that he has fixed, he distinctly and in a few words calls the attention of the captain interested to this fact; he must in this case transmit his orders through the intermediary of his assistant, in order to be able to continue to devote himself to the other rôles that are incumbent on him and also in order not to confuse or distract the captains without necessity by his presence.”

MASS FIRE.

A mass is the reunion of two or more groups for a common action under the same command.

The Manual thus defines the conditions for the employment and the method of execution of mass fire:

"Mass fire is employed for the purpose of producing with the artillery the greatest possible effect in determined phases of the combat.

"Generally, this fire will be directed against a single objective; but, under certain circumstances, it may also be distributed between two or several objectives, for what characterizes mass fire is not unity of objective but unity of direction.

"The different groups that form the mass can almost never be united on the same position. Consequently, it will be necessary to establish a service for the transmittal of orders, which, in combination with that of the group scouts, will form the system of communication between the commander of the mass and the chiefs of groups.

"As a general rule, the commander of the mass will station himself with the group that is nearest to the centre of the line.

"Orders will be restricted to a minimum and they will be as clear and concise as possible; when not transmitted by officers, they will be written upon blanks destined solely to this purpose; it will furthermore be expedient to issue them always in duplicate and to avoid everything that might produce the slightest confusion."

The commander of the mass may, if he deems it opportune, assume the command of the central group, which from that moment will, as a rule, play the rôle of guide-group.

The service of the transmittal of orders being liable to accidental failure, the commander of the mass should in many cases guard against the hazards of this service by establishing with the chiefs of groups a certain number of conventional signals susceptible of being employed during the firing.

With a view of avoiding the trouble that might result from a delay in the communication of orders or signals, the Manual prescribes expressly that "although the group commander must subordinate his initiative to that of the mass commander, so long as the mass has an organic existence, yet he must be ready to resume it absolutely when communications or signals are wanting; for the absence of orders could not excuse his inaction, even for an instant."

III. RECAPITULATION OF THE METHODS OF FIRE.

Firing against a fixed object.—Shrapnel fire constitutes the general rule. It is employed from the long ranges down to 300 metres. For distances under 300 metres, canister fire is used.

For distances between 700 and 300 metres, the shrapnel fuse is cut at zero.

The method of the regulation of the fire against a fixed object comprises two distinct operations:

1. The determination of a bracket whose limits differ by 50 metres in percussion fire and by 100 metres in time fire;
2. The correction of the elevation and, simultaneously, the regulation of the time of flight, if necessary, by the firing of a series of six

rounds each, commencing with the elevation that corresponds to the short limit of the fork.

In time fire, the shrapnel is regulated as soon as the object is enclosed in a bracket of 100 metres, without proceeding to a preliminary verification of the limits of this fork. It is only after the regulation of the time of flight that the elevation is verified by firing a series of time shots. In executing these series, the elevation of each is increased 100 metres over that of the preceding series.

Fire with combined elevations.—Great importance is attached to this kind of fire, which is the rule for distances under 1500 metres. For these distances, a bracket 400 metres wide suffices and as soon as this has been determined time fire is immediately begun, the elevation corresponding to the short limit of the fork being given to one section and this elevation increased by 50 or 100 metres to the other section.

This kind of fire is also the rule when the observation of shots presents any difficulty; but in this case it is first sought to contract as much as possible the limits of the bracket.

Fire against a moving object.—The method of regulation against a moving object consists in enclosing the target within a bracket of variable amplitude, in employing slow fire toward the proper limit, then rapid fire as soon as a shot is observed near the target; when the objective has crossed the dangerous zone, the elevation is modified by 200 metres and the fire is continued under the same conditions as previously.

However, if it is known that the objective will pass certain points, the fire is regulated on these points and a rapid fire executed the moment the objective attains them.

Fire against a masked object.—The Manual treats in detail the subject of fire with indirect laying, and lays down the principle that, if the artillery wishes to escape the reproach of being a slave to the ground, its fire must have as much efficacy in defiladed positions as in open positions, provided, however, that the captain be able to see the object without quitting the battery.

Group fire.—There exist no special rules for group firing: the only rule prescribed being that the first battery to find the range will communicate this information to the other batteries. However, provision is made for the case in which the chief of the group may assume the direct command of the batteries and proceed to the ranging, by section or battery salvos, as if the group constituted but a single battery.

Mass fire.—This fire is characterized by unity of direction and not by unity of objective.

There is no special rule for the execution of mass fire. The Manual confines itself to laying down general principles and to calling special attention to the communication of orders and to the duty of group commanders of exercising their initiative when necessary.

Thus, as has already been pointed out, the rules prescribed by the

Manual leave a great deal of latitude to battery and to group commanders in the choice and the application of methods.

CONCLUSION.

From what precedes, it is seen that the rules of fire of the Spanish artillery belong to the category of those in which precision is momentarily sacrificed with a view of obtaining useful effects in the shortest time possible.

As in the German method, time fire is generally opened as soon as the object has been enclosed within a bracket of 100 metres and without a preliminary verification of the limits of this fork.*

Now, it is known that the present tendency is more or less marked in favor of the reverse principle. In England, Italy, and Russia, the limits of the bracket are verified. Even in Germany, this verification has many supporters; thus, General Rohne, taking as a basis for his argument the considerable proportion of erroneous brackets obtained in the practice of the firing schools, considers the verification of the fork as indispensable in all cases.†

In firing at distances under 1500 metres, the Spanish artillery, still having in view the rapidity of obtaining the first useful effect, passes to time fire as soon as it obtains a bracket 400 metres broad; it then employs a combination of two elevations.

As bearing on this subject, it may be asked whether the delay in commencing the time fire caused by seeking a bracket of 200 metres, admitted in this case by the German artillery, would not be largely compensated by the suppression of the complications resulting from the use of two elevations in the same battery.

Fire with indirect laying has been a subject of the most careful study in the Spanish artillery.

To obtain laying in direction in this kind of fire, this artillery has adopted a special system of pickets, sighting-rods, and of auxiliary front and peep-sights, while for this purpose are employed:

In Germany, a pointing board, which is a sort of alidade placed on the plane surface of the breech;

In England, Italy, and Russia, a plumb line and sighting-stakes.

Although possessing special guns for curved fire (9 c. and 15 c. mortars), the Spanish artillery sanctions the use of a reduced charge for its field-guns in cases in which it is necessary to have a trajectory very much curved. This charge is half of the normal charge. So far as we know, and since Austria has abandoned the *Wurffpatronen* (reduced charge for high angle fire), this method does not exist anywhere else except in Italy, where the 9 c. gun uses for plunging fire a charge of 255 grams of filite.‡

* It is proper however to remark that in Spain the firing of salvos by two or three pieces is employed for ranging, and that this process, through the chances of accuracy that it gives, compensates in part for the disadvantages that may result from an absence of verification.

† *Memorial de Artilleria*, January, 1897, page 25.

‡ See *Revue d'Artillerie*, Vol. 47, February, 1896, pp. 525 and 531.

As other characteristics of the Spanish rules of fire, the following may be mentioned:

The use of salvos by two or three pieces during ranging.

The existence of an auxiliary personnel specially assigned to the observation of shots, to which the battery commander may refer for the purpose of verifying his personal estimates in all that concerns the observation of the shots.

A. DIRAT, Captain of Artillery.

AN AMERICAN SMOKELESS POWDER.

By FREDERICK H. MCGAHIE.

THE admirable Army and Coast Defense *Supplement of the Scientific American* contains in the article upon smokeless powders this sentence: "It is sincerely to be hoped that every effort will be made to substitute it altogether for the obsolete brown powder with which we are handicapped in the present war."

The virtues of smokeless powder that have caused it to supersede brown powder are absence of smoke, increase of projectile velocities and energies, reduction in weight of charge, and greater regularity of action. Smokelessness means inability of attacking or defending forces to locate satisfactorily on land opposing guns or concealed troops, and in naval operations no interference with gun fire; increased velocities give flatter projectile trajectories, with consequent improved accuracy of fire; increased projectile energies correspond to greater penetrative power; reduced weight of charge allows the carrying of a larger number of rounds of ammunition and permits the securing of the higher velocities without endangering the present gun mounts; a greater regularity of action gives better chances of successful hits. Hitherto the chief drawback of the smokeless powders has been the accompaniment of high ballistics by excessive erosion. Bad chemical and mechanical stability is due to ignorance of the subject, as was exemplified in the case of the inventor of a powder, much exploited in the past, who stated in a patent specification that dinitrobenzene and urea were chemical equivalents.

The basic constituent of these powders is nitrocellulose, of which there are many varieties, differing in their explosive power and chemical properties. They are broadly divided into soluble or low grade gun-cottons and insoluble or high grade gun-cottons with reference to their action with a mixture of ethylic alcohol and ethylic ether. They are more exactly specified by the percentage of nitrogen they contain. Gun-cotton cannot be used in its original condition in guns, for it burns too rapidly, however much it may be compressed. But, when dissolved in a solvent and the solvent dried out, a dense colloid results, with a

much slower rate of combustion that is controllable for the various conditions of gunnery, through its property of burning on the exposed surface only. Thus a cube remains a cube in all stages of combustion.

By means of a common solvent, nitroglycerine may be incorporated in various proportions with nitrocellulose. Early experiments with such powders developed the facts that, while the nitrocellulose type gave reasonable erosion, the desired increase of ballistics in high power guns could not be secured, and that the nitroglycerine type gave ballistic and erosive effects corresponding to the percentage of nitroglycerine used. How serious this wear upon the gun is in such cases may be gathered from the following comment from the 1895 Report of the Chief of Ordnance, U. S. Army, upon tests of a high grade nitroglycerine powder: "The results with this powder were particularly favorable as regards velocity and pressure. The indications, however, of extreme heat were very apparent; the mushroom head showed plain signs of erosion and the manufacturers' marks on the pressure gages were completely obliterated in a few rounds." Improved armor makes heavy demands upon the high power rifle, and the question of compromising between these antagonistic properties of smokeless powder has been a perplexing one. With the nitroglycerine type the tendency has been to add some inert substance or weak nitro compound to lower the temperature of explosion, the preponderating cause of erosion. The effect is limited. Sometimes nitrate of barium is added to the nitrocellulose type to increase its ballistic power, but this plan has the disadvantage of a corresponding amount of smoke by the formation during explosion of a solid compound, barium carbonate. The true smokeless powders yield entirely in decomposition under service conditions colorless gases. In the case of black powder the smoke-producing solids constitute 56 per cent. of the products of combustion. Typical powders are cordite, with 57 per cent. nitroglycerine, 38 per cent. high grade gun-cotton, 5 per cent. vaseline; ballistite, with 50 per cent. nitroglycerine and 50 per cent. soluble gun-cotton; B. N., with 60 per cent. mixed gun-cottons, 20 per cent. barium nitrate, 10 per cent. potassium and sodium nitrates, the solvent employed attacking the soluble gun-cotton only; Peyton powder, with 40 per cent. nitroglycerine, 40 per cent. soluble gun-cotton, 20 per cent. picrate of ammonium.

An American powder, the Maxim-Schupphaus, offers a superior and scientific solution of the problem whose correctness has been proved by trials and tests extending over the last four years. It is the standard of the United States army, and after futile attempts to produce a satisfactory powder of their own, the United States navy has lately adopted it.

Robert C. Schupphaus, Ph. D., and Hudson Maxim were both pioneers in the American field, having submitted independently in 1890 smokeless powders for the small calibre rifle upon which the ordnance department of the army had begun experiments. Excellent results were

secured, but no prospect of any business for years led them to abandon their work. These powders embrace the best types of present small-arms powders. In 1893 they combined to develop a system of projecting large masses of high explosives from rifled guns. The first need was a propellant that would give a less sudden initial acceleration of the projectile, with a subsequently more uniformly sustained acceleration than was possible with known powders. At the same time the produc-

FIG. 1.

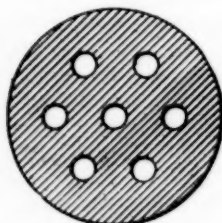
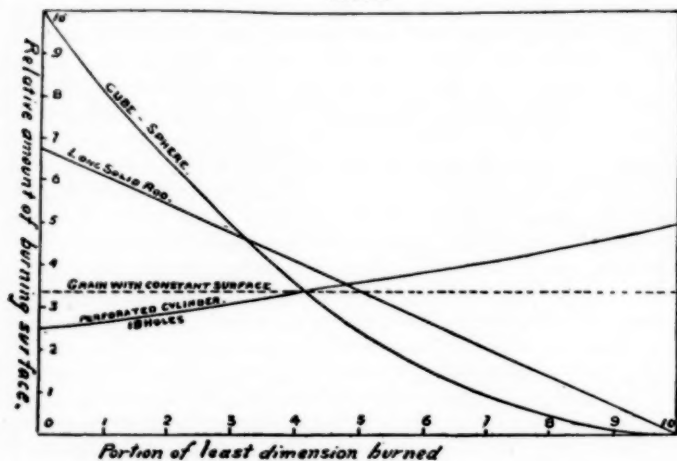


FIG. 2.

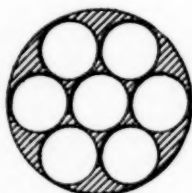


FIG. 3.

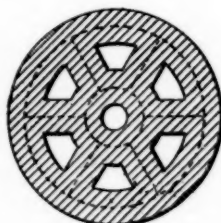


FIG. 4.

THE MAXIM-SCHUPPHAUS MULTI-PERFORATED SMOKELESS POWDER.

tion of a suitable powder for the large rifles was kept in mind. The philosophy of the solution was the use of gun-cotton as the chief constituent to insure low erosive effects and the employment of a form of grain such that the surface exposed to the igniting flame would be relatively low and then increase rapidly up to the moment of complete combustion. The result would be that the projectile would be started gradually and then followed in its movement by such a rapidly growing amount of gas that the accelerating pressure on its base would be well

sustained and tend to the limit of following the curve of tangential elastic resistances of the gun. Recalling the property of colloidal, smokeless powders of burning up geometrically layer by layer, let us examine the influence of the form of grain. The long solid cylinder represents the best average conditions. Its burning surface is a maximum at the moment of ignition and decreases rapidly to zero as the square of the diameter at any instant during combustion. The point involved is better illustrated by considering that, when the rod is burned half way through, the amount of its weight transformed into gas is $\frac{3}{4}$. Now this occurs when the shell has travelled approximately $\frac{1}{4}$ of its distance along the bore, and there is left but $\frac{1}{4}$ of the charge to pass into powder gas during the remaining $\frac{3}{4}$ of the shell's travel. This is evidently not an ideal way of sustaining the pressure. Theoretically a rod pierced with a central hole and a laminated grain of such dimensions that the end surfaces are negligible are better, both giving a constant burning surface. But in practice laminae give very irregular results, the packed grains hindering free inflammation, and the pierced rod has to be in such short lengths to avoid disruption by accumulated powder gas in the hole that the end surfaces enter appreciably into the case. In the development of the Maxim-Schupphaus powder it was calculated that by the use of a cylinder perforated with many axial holes the initial surface would be less than with any other practical grain, and that the burning surface and rate of emission of gases would be increasing functions. Fig. 1 shows this graphically. It is based upon the assumption that equal charges of any formula are made up into the shapes indicated, the burning thickness of the grains being the same. The details of shaping dies being settled, the real difficulty obtruded itself in the shape of a working formula of the nitrocellulose type. Experiments with powders based upon all the knowledge of the day failed to give satisfactory results. Two conditions prevailed. Either the rod upon leaving the die would swell irregularly with a corresponding distortion and closing up of the perforations, or, if the rod was perfectly shaped, it would soon warp to pieces. Powder grains must be uniformly exact and mechanically strong. Extensive experimenting led to the discovery of a new property of nitrocellulose, a combination of gun-cottons that when treated with a solvent in the usual manner gave an inelastic compound taking all complicated dies in the most elegant manner, free from warping strains in drying, and plastic under heat. It permitted the admixture of nitroglycerine and solid compounds in all permissible amounts. Tests were made in the complete range of army guns, and the powder's high ballistic properties, excellent mechanical and chemical stability, low erosive effects, and unequalled regularity were fully demonstrated.

The commanding officer of Sandy Hook proving ground, in his 1896 report, wrote of its results, "They compare favorably with the best results obtained with foreign powders." Examination of the guns

after firing showed always so little signs of erosive action as to excite comment by the officers in charge. Tests were made with various compositions in the small calibre rifle to ascertain their relative erosive effects. After 5000 rounds the high grade nitroglycerine powder had caused a falling off in velocity of 150 foot seconds; the M.S. had caused none. The barrels were then cut open and examined. As the report stated, the erosion produced by the M.S. powder was quite slight and that by the high grade nitroglycerine very heavy. These firings gave also an excellent illustration of how the form of grain affects the ballistics of a formula. The small calibre rifle, with the necessity of a powder acting satisfactorily in the loading machine, permits only the very simple grains; so that results must be obtained through the formula entirely. The nitroglycerine powder in this rifle gave 2000 foot seconds on 32,000 pounds pressure; the M.S. formula gave the velocity on 45,000 pounds pressure. Yet in the 3.2-inch field-gun, permitting the multiperforated grain, the results were practically identical for the two powders. Some of the tests it has been through will indicate its satisfactoriness. A batch of powder was divided after acceptance tests into two lots, one being put into open boxes and the other being loaded up into fixed ammunition. After exposure for 18 months in a magazine to atmospheric conditions the two lots gave results identical with the proof firings. It has been submerged under water for 15 hours and then dried in the open air without showing any physical changes or loss of power. After standing two or three years, no samples exhibited any reduction of chemical stability. The formula employed during its development was 90 parts mixed gun-cottons, 10 parts nitroglycerine, 1 part urea, the nitroglycerine being added principally to insure good ignition. But the M.S. powder is not a definite one. The formula can be varied widely, so as to meet all beliefs of ordnance experts. To illustrate this range, it may be said that the following powders have been most successfully manufactured into multiperforated grains under this system: pure gun-cotton powders with considerable variation of explosive power; powders with gun-cotton as the base containing from 5 per cent. to 60 per cent. nitroglycerine, alone or combined with desirable proportions of cooling compounds, such as picrate of ammonium, dinitrobenzine; gun-cotton powders with 10 per cent. to 40 per cent. of nitrate of barium. The army will use a powder containing about 25 per cent. of nitroglycerine, with a corresponding lowering of strength of the gun-cottons to keep the temperature of explosion down to that of the original formula. The navy will employ the nitrate of barium type. The American patents have been acquired by the famous firm of E. I. Dupont de Nemours & Company. Some firing records are given in the following table, on page 517.

Testimony to the value of the system can be found in the late reports of the Chief of Ordnance, U. S. A. I abstract the following: "An example showing the effect of form of grain occurred in my ex-

Gun.	Charge.	Projectile.	Muzzle Velocity.	Pressure.	Remarks.
8-inch steel rifle, U. S. A.....	77 lb.	300 lb.	2,275 foot seconds.	34,200 lb.	{ 125 lb. of brown powder gives 2,000 foot seconds on 37,000 lb.
10-inch steel rifle, U. S. A.....	128 "	575 "	"	34,500 "	{ 250 lb. of brown powder gives 2,000 foot seconds on 37,000 lb.
12-inch steel rifle, U. S. A.....	220 "	1,000 "	"	36,000 "	{ 450 lb. of brown powder gives 2,000 foot seconds on 38,000 lb.
5-inch siege gun, U. S. A.....	{ 5 "	45 "	"	21,800 "	{ 13 lb. of black moulded powder gives 1,830 feet on 35,000 lb.
	{ 9.3 "	45 "	"	35,000 "	{ 30 lb. of brown powder gives 2,250 foot seconds on 33,600 lb.
5-inch R. F. Gun, U. S. N.....	11.75 "	50 "	"	34,000 "	{ 5 lb. 10 oz. of cordite supplied with gun gave 2,078 feet velocity on 39,500 lb. pressure.
4.7-inch Armstrong R. F. gun....	6.8 "	55 "	"	33,600 "	{ 17 lb. of brown powder to give 2,280 foot seconds to 35 lb. shell and 1,790 foot seconds to 55 lb. shell.
4.7-inch Hotchkiss R. F. gun....	{ 10.9 "	35 "	"	35,000 "	{ 3 lb. of black powder gives 1,900 foot seconds on 35,000 lb.
	{ 9.1 "	55 "	"	33,200 "	{ 10.5 lb. of black moulded powder gives 1,100 feet on 28,000 lb. pressure.
6-pounder R. F. Gun, Driggs-Schroeder.....	1.25 "	6 "	"	34,500 "	
7-inch howitzer, U. S. A.....	4.75 "	105 "	"	15,000 "	

perience during the year. Working with a fixed composition, I endeavored, by varying the thickness of a flat grain, about three-eighths of an inch square, to adapt it to the field-gun. The best results obtainable were 32,000 pounds pressure for the standard velocity of 1450 feet per second. I then had the same material made in the form of a seven-perforated cylindrical grain and got at the first trial 1450 feet per second with 26,500 pounds pressure. * * All things considered, the perforated cylinder or disk proposed by General Rodman many years ago and recently revived in the Maxim-Schupphaus powder appears to me the most suitable and promising form for the colloidal smokeless powders."—Captain Sidney E. Stuart, Inspector of Powder.

"Experiments have shown that the most satisfactory form of grain, as being the most progressive, is the multiperforated cylinder, and as, by increasing the number of perforations, a grain of any desired size may be obtained for any given

thickness of the walls between the perforations, it would seem that by this method a free and unhindered inflammation of the charge could be obtained and at the same time the maximum of ballistic power realized for a given type of powder."—Brigadier-General D. W. Flagler, Chief of Ordnance.

These records have been obtained with a form of grain not utilizing the system to its best advantage, so that higher ballistics are obtainable if desirable. Fig. 2 shows the section of the grain employed. With this grain the highest results are obtainable when it is proportioned to burn out to Fig. 3 as the projectile leaves the muzzle. But the unburned segments represent wasted powder and the very objectionable feature of flames from the breech in rapid-fire work. Consequently, a smaller grain, giving less favorable results, must be employed to secure this necessary complete combustion. The table refers to satisfactory grains. To obviate this, a grain of section in Fig. 4 is now employed, the dotted lines indicating how complete combustion and maximum surface are correlated. An increase in the number of perforations will act advantageously. For use in torpedo guns the multiperforated grains will be coated on the outside with some very slow-burning varnish, so as to make the conditions yet more favorable.

A brief sketch of the manufacturing process will be undoubtedly of interest. The dry gun-cotton in the form of fine dust is dumped into a water-jacketed mixing machine with a helical frame blade with fair clearance. The liquid mixture of nitroglycerine and solvent is sprinkled slowly upon the gun-cotton while the blade is tumbling it about. At this point these explosive substances lose much of their sensitiveness and the ability of detonating. They can simply burn. The solvent makes this change. The cover being closed and warm water circulated through the jacket, mixing goes on for several hours. The resulting pasty mass is taken out and worked upon steel rolls to a firm sheet about one-quarter of an inch thick. The sheet is rolled up and put into a hydraulic stuffing press, and the working head bolted on. This head carries a hole into which the dies may be screwed and also a valve connection from a vacuum pump. The die hole being closed with a blank plug, a vacuum is produced in the press, the valve closed, and the powder sheet compressed into a solid mass. The die is put in and the powder forced through it at a pressure of from 2000 to 4000 pounds per square inch. The issuing rod is cut up into suitable lengths, which are taken to the cutting machine to be chopped up into grains of the desired length. These are then put on racks in a room heated to 120° F. and dried to a constant weight. This takes from five days to fourteen days, varying with the size of the grain and the formula employed. A slight treatment in a vacuum drier then follows as a precautionary measure, and the powder is ready for shipment to the proving ground.

AUTOMATIC SIGHTING.

BY COLONEL H. S. S. WATKIN, C. B., R. A., CHIEF INSPECTOR OF POSITION FINDING.

(From Proceedings of the Royal Artillery Institution.)

THE question of automatic sighting is now so much to the fore, and so many statements have been made as to their capabilities, that I think it might be of interest to look into the question both from a theoretical and practical point of view.

An automatic sight is one which finds the range and at the same time sets the gun to the elevation due to that range, by the mere act of laying the sights on the water line of the object. It is a *sine qua non*.

(1) That the gun must be at a certain known height above the water level; the greater the height the greater the accuracy.

(2) That the platform or emplacement must be truly level all round, and must continue so during firing, and this to a far greater accuracy than we have hitherto been accustomed to in our coast guns.

The theory of the apparatus will be seen from the following:—

Let $F B$ represent a gun, placed at a height $B D$ above the sea-level

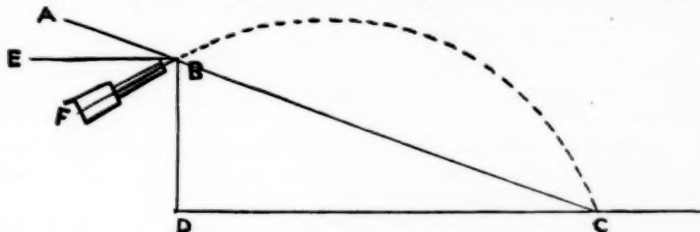


FIG. I.

$D C$, and at such an angle of elevation that a shot fired from it will hit the water at the point C . Draw $E B$ parallel to $D C$. It is clear that under these conditions, if the tangent scale $A F$ is raised to a height $A F$, representing the elevation due to the range $B C$, the object C will be in line with the fore and hind sight.

Then $A B F = \text{Tangent angle of elevation.}$

$E B F = \text{Quadrant angle of elevation.}$

$B C D = \text{Angle of depression of object due to the height of the battery and the range, conveniently called the range-finding angle.}$

$E B F = A B F - A B E.$

But $A B E = B C D$ because $E B$ was drawn parallel to $D C$.

$\therefore E B F = A B F - B C D.$

The angle BCD for ordinary heights can always be calculated from the formula.

$$\text{Depression angle in minutes} = \frac{\text{Height in feet} \times 1146}{\text{Range in yards.}}$$

The conditions to be fulfilled then for automatic sighting are that when the gun FB is elevated to any given angle to the horizon (quadrant angle), the tangent scale FA must at the same time be automatically raised to the height, representing the distance the shot will be thrown due to that quadrant angle, or *vice versa* if mechanism to fulfill the above condition is fitted to a gun, then whenever the eye looking over the sights sees the water line of the object, the gun will of necessity be at the right quadrant angle to hit that object.

It may not be generally known that having a gun fitted with a quadrant elevation scale, a modified form of automatic firing may be carried out. Thus, suppose we wish to fire at a target at a distance of 2200 yards which is slowly coming in. We could place the gun at the quadrant elevation due to 2100 yards, raise the tangent scale also to 2100 yards, and fire the moment the sights are on the water line of the target. It is evident that by so doing we have fulfilled the conditions given in Fig. 1, and that when the object is seen over the sights the target is at 2100 yards.

The condition of accuracy can be obtained from the equation.

$$EBF = ABF - BCD, \quad \text{and are}$$

(a) That the range-finding angle BCD must be obtained with accuracy, in order to obtain the range for setting the tangent scale ABF .

(b) That any variation in the level of the platform will seriously affect the accuracy, inasmuch as it alters the quadrant angle EBF , and the angle of inclination of the sights.

With regard to (a) it is clear that the greater the height the less any inaccuracy in obtaining the depression angle will affect the range, and a short range will be far more accurately obtained than a long one. Take for example a height of 50 feet and 200 feet and ranges of 1000 yards and 5000 yards.

At 50 feet the depression angle for 1000 yards is 57.3 minutes.

"	"	"	1025	"	55.9	"
"	"	"	5000	"	11.46	"
"	"	"	5025	"	11.40	"

That is to say to observe to an accuracy of 25 yards an angle of 1.4 minutes must be taken at 1000 yards, but at 5000 yards an angle observation of 0.16 minutes is required.

At 200 feet the depression angle for 1000 yards is $3^{\circ} 49'$ minutes.

"	"	"	1025	"	$3^{\circ} 43'$	"
"	"	"	5000	"	$0^{\circ} 45.84'$	"
"	"	"	5025	"	$0^{\circ} 45.61'$	"

That is, a difference of 6 minutes only alters the range 25 yards at 1000 yards, but at 5000 yards an error of 0.23 minutes will cause a same alteration of range.

These examples show what small angles have to be observed when the height of the battery is small, and that far more accuracy is required at long ranges than short ones. A good rough rule for obtaining the errors at various ranges is to multiply the error at 1000 yards by the square of the range. Thus, supposing the error due to laying be 20 yards at 1000 yards, the error from the same cause at 2000 yards would be $20 \times 4 = 80$ yards, at 3000 yards it would be $20 \times 9 = 180$ yards, and so on. The error due to height for any given range is very nearly inversely proportional to the height. Thus, for example, if an error of 20 yards is obtained at 150 feet height, the error from the same cause would be three times twenty at a height of 50 feet.

The errors we have been discussing are those due to actual laying; the important question then is with what accuracy can the human eye observe an angle. I have had considerable experience in this matter, and I feel convinced that the limit for deliberate laying is one minute, and a greater angle if the eyesight is not good or properly trained. But where as in automatic sighting the observer has to follow a rapidly moving object, this limit must be at least doubled.

Granting this, it is easy to lay down the error that will be obtained with an automatic sight, from this cause at any given range and height. The following is a table assuming the error to be two minutes:

Height Feet.	RANGE. YARDS.				
	1000	2000	3000	4000	5000
50	36	149	351	651	1058
100	18	72	166	305	478
150	12	47	109	196	308

The above are the errors worked out mathematically. For those who may be skeptical on these points, the following gives the actual errors of laying an automatic sight in 1879 when tried by a committee of experts. The sights were laid on a steamer moving out of the harbor, height of battery 150 feet.

Range.	Error.	Range.	Error.
1310	40	2580	210
2240	90	3140	500
		3900	890

So far then as regards the error due to the unaided eye, of course this will be reduced if telescopic power is applied. In certain weathers, in

fog, and with powder smoke hanging about, a telescope cannot always be used with advantage.

We now come to the serious errors arising from want of level of the emplacement platform, etc. It must be in the experience of all officers who have worked with coast artillery how much the racers are out of truth, and if level to-day soon go out of truth with firing. So that the application of automatic sighting to the older form of guns and platforms is out of the question except for very short ranges. Even with the newer types the accuracy must be very considerable. Suppose, for purposes of calculation, we take the error of platform at four minutes, the following table gives the error for a 6" Q. F. gun mounted at a height of 50 feet.

Range.		Error.
1000 yds.	+	12 yds.
2000. "	or	270 "
3000 "	—	750 "
4000 "		1550 "
(+ when platform is depressed)		
(— " " " elevated)		

The method of arriving at these figures is as follows. Imagine the gun fitted with automatic sights to be placed on a platform capable of being tilted. When the platform was level, and the sights laid, say at 2000 yards, the gun would be at a quadrant elevation of $1^{\circ} 28'$, that is $1^{\circ} 57'$ (tangent elevation for 2000 yards) minus $0^{\circ} - 28.6'$ (the range-finding angle).

Now if the platform is tilted 4' down to the front it is evident that the gun will be at 4' less quadrant of elevation, and thus throw the shot 57 yards short of the 2000 yards. At the same time the line of sight will also have been tilted 4' down, and will cut the water at 1757 yards instead of 2000 yards. So that when the gun layer brings his sights up to the target at 2000 yards, he will be virtually elevating the gun to 2270 yards (see above table). We see then that a very slight variation in the level of the platform, causes a large error in the quadrant elevation, owing to the automatic mechanism.

I think I have given figures enough to show that except, under special conditions, automatic sighting will not and cannot do away with the ordinary way of finding the range and laying the gun. Officers who have worked with the D.R.F. and P.F. know how exactly the instrument must be levelled in order to obtain correct ranges, and this with levels that easily show difference of $\frac{1}{10}$ of a minute. How then is it possible to make a big gun on its comparatively rough mounting into a range-finding instrument. Of course, if you can get a site with a height of 200 or more feet, and are satisfied with moderate ranges, it can be done, but extraordinary care must be taken even then to have the racers, etc., very true.

It must be remembered that in firing with an automatic sight, the

errors given under the headings (*a*) and (*b*) might be in the opposite direction and counteract one another, and good shooting would result; on the other hand they might be in the same direction when the results would be deplorable.

So far I have only given the theoretical conditions on which the automatic sight is based, the methods of carrying them into practice have been various. The one that perhaps will be most easily understood is the Italian sight tried in 1878-79. In this a rack *G* fixed to

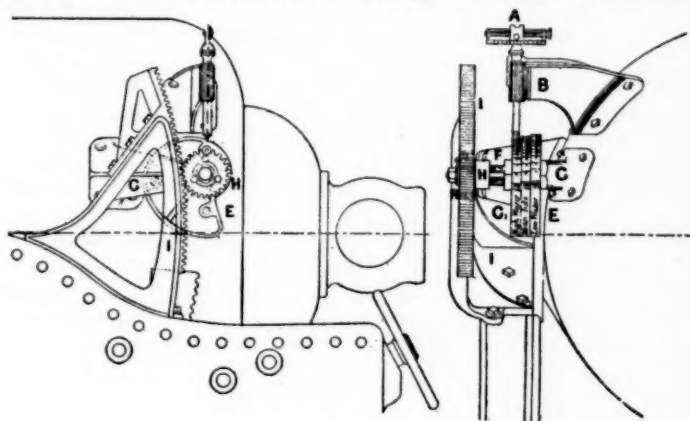


FIG. 2.

the carriage, revolves a pinion *H* in a fitting attached to the gun. Fixed to the pinion are three cams *E*, for use at low, mean and high tide. The tangent scale *A* sliding up and down freely in a socket *B* fixed to the gun has its lower end resting on one of these cams. The cams being cut to a proper curve it follows that when the gun is elevated or depressed the pinion *H* is revolved by the rack *G*, and the sight raised or lowered to the proper height to fulfil the conditions given in Fig. 1. This arrangement is rather inconvenient for the "layer," as he has to raise and lower his head for every movement of the gun.

I had tried some experiments at Gibraltar in 1876 on the same lines but found the racers too much out of truth to admit of any accuracy. In designing my sight in 1894 for the War Office, it occurred to me that the disadvantage of the hind sight moving up and down would be got over if it could be arranged for the fore sight to move instead. It is evident that as far as giving an angle of elevation is concerned it matters not which sight is moved. Figs. 3 and 4 show this sight which was successfully tried at a target travelling 18 to 20 knots. It is fixed to the ordinary fore sight of the gun, with which it did not in any way interfere, and thus allowed of ordinary laying being resorted to at any moment. A 6-pr. in which the sights recoiled with the guns was pur-

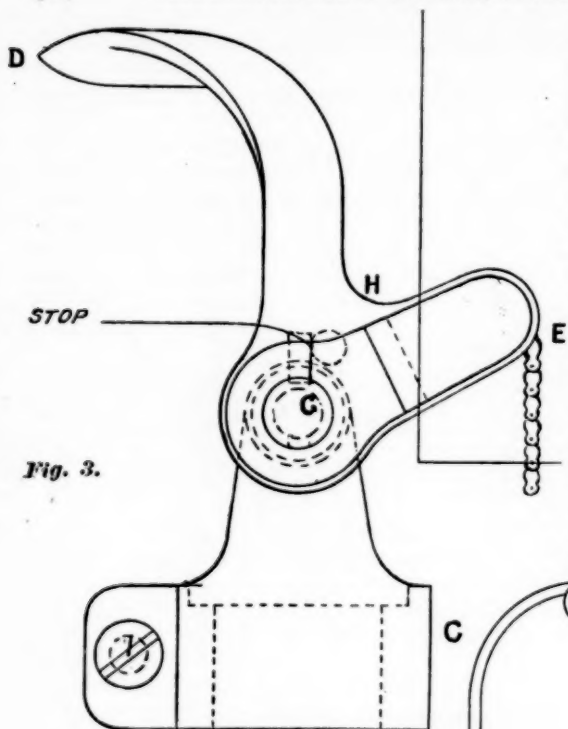


Fig. 3.

G E is a projecting piece, forming part of the lever *G D*. Around the end of *E* is passed a chain, one end of which is fixed at *H*; the other end being attached to a fixed part of the mounting. A spiral spring *K* enclosed in a box presses the lever *G E* upwards, and thus keeps the chain taut. It is evident from this arrangement that as the trunnions on which the gun revolves are behind the fore sight, if the gun is elevated the chain pulls down the lever *G E*, and with it the point of the sight *D*. This as far as sighting is concerned is the same as if the tangent scale was raised. The amount the point *D* is depressed for any given move-

posely selected by the committee, and I was specially debarred from using a telescope. Fig. 4 gives a front view of the fore sight of the gun with my automatic arrangement fitted to it. Fig. 3 a side view, both full size.

D is an acorn sight at the end of a lever *G D*, which is capable of revolving round an axis *G*.

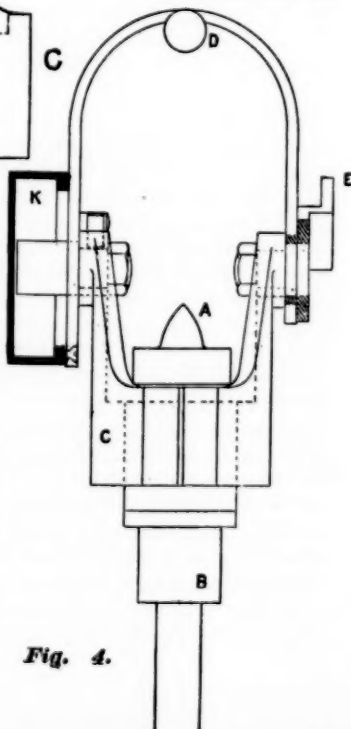


Fig. 4.

ment of the gun is governed by the position, length and shape of the end of the arm *G E*. This is arranged to suit the height of the gun above the sea-level, so that the condition given in Fig. 1 may be fulfilled. That is the act of laying the sight on any object on the sea-level, brings the gun to the right quadrant elevation to hit that object. To allow for rise and fall of tide, or variation of powder, the end of the chain attached to the fixed portion of the mounting is capable of being moved up and down by a milled headed wheel, on which was engraved yards over or under, and feet scale, of rise and fall of tide. The officer in charge could thus without stopping or interfering with the layer alter the shooting as he pleased to meet the variation of the day.

The problem of automatic sighting, applied to the carriage with no recoil to take into account, is, I think, a simpler matter, and more easily admits of the application of telescopic power. As to the best telescope, I have no hesitation in saying it should be one with very low magnifying power and large field. After a good deal of difficulty I have managed to obtain such a telescope.

In conclusion, I trust I have sufficiently explained automatic sighting to allow of the principle on which it is based being understood and at the same time pointed out the danger of supposing that they can take the place generally of the present methods of laying guns.

MACHINE GUNS.

BY CAPTAIN M. E. CARTHEW YORSTOUN, 4TH BOMBAY CAVALRY
(POONA HORSE).

(From *Journal of the United Service Institution of India*.)

"If made use of intelligently on active service, the machine gun of infantry rifle calibre that will fire with smokeless powder and be sighted up to 3000 yards will mark a new era as pronounced as that when rifle or when breech-loading small-arms were first adopted."

—Lord Wolseley.

THESE words were written more than twelve years ago, and yet, during this time, the machine-gun question has made but little progress, and it is scarcely too much to say that at the present date the army is but little better served in the matter of machine guns than it was twelve years ago.

The reasons for this are probably traceable to the extreme conservatism of the British army; to the doubt which still exists in the minds of many as to the utility of machine guns; to the indifferent success which in some cases has attended their use; and perhaps above all to the difficulty which has been experienced in obtaining a suitable equipment.

The ideal machine gun may be defined as one which (1) never

"jams" or gets out of order in any way; (2) can accompany troops in any country; (3) can be got in and out of action in a few seconds; and (4) is handled by competent men in an intelligent manner. It is the object of this paper to try and show that the failures of the past are mostly due to causes which it is possible to remove, and that it is by no means impossible to reach my definition of the ideal machine gun. That such a weapon would add to the fighting power of an infantry battalion or cavalry regiment will be readily admitted, and indeed, though the matter is still in an embryo condition, though gun detachments are usually insufficiently trained and indifferently equipped, examples are not wanting, both in Africa and on our frontier, of the great utility of machine guns. A withering and concentrated fire at the critical moment of the fight is after all what usually decides the fate of battles. What was it that halted the advance of the French Guard at Waterloo and nearly turned Gravelotte into a defeat for the Germans? What has stopped the rush of Zulus, Dervishes, and Tribesmen in a hundred fights? A sudden and awful rifle fire which could not be faced! and I venture to think that it is on such occasions that the power of machine guns will some day be felt.

Unfortunately my definition of the ideal machine gun has not yet been reached. In the Soudan, Gardners and Nordenfelts constantly "jammed," and, even with the more modern Maxim, "jams" are by no means uncommon. The latter has no doubt done well on occasions, as at Chakdara and in different parts of Africa; but still on the whole its utility in the field cannot be said to have come up to our expectations.

Now I believe that (1) "jams," (2) indifferent training, and (3) want of adequate equipment, account for most failures, and it is to these points that I would draw attention. Probably "jams" and indifferent training go hand in hand, for the latter certainly leads to the former; and as regards the third point, it is indeed strange if mechanical science cannot overcome the difficulty of equipment.

Instruction.—It may be assumed that the Maxim gun has, for the present, distanced all competitors. But the Maxim gun is a somewhat delicate little engine, which, like any other machinery, is apt to get out of order if placed in unskilled hands: consider the rate at which the gun works and the number of movements, rotatory, horizontal and vertical, all going on at the same time, and it is really surprising that this is ever got to work at all when used by men who have only a superficial knowledge of the mechanism. We do not ask a railway porter to drive the locomotive. Intelligent non-commissioned officers and men may easily learn to lay, load and fire the gun, and may even attain to some technical knowledge of the machinery; but to instantly grasp the cause of a "jam" or stoppage, put it right, look after the "bearings," or replace a broken part, requires a higher mechanical training; we require experts for this, and to obtain them I would suggest that from

each regiment a few specially selected officers and non-commissioned officers, together with a few men, if possible selecting men who are mechanics by trade, be put through an advanced course of machine-gun instruction, and examined from time to time, that their knowledge may be kept up to concert pitch. The superficial machine-gun course at present taught at our musketry schools is not sufficient; some of the instructors themselves have not the requisite knowledge of the subject, and, moreover, the time given is inadequate; most instructors admit that this is the case: the result is that pupils are dismissed with certificates that they know all about the Maxim gun, but the first time the gun refuses to work they find themselves in a fix, and the Maxim gun is voted a failure. Only the other day a man said to me "I am sick of Maxims; I have never seen them fire fifty rounds without jamming." Quite so!—but the fault did not necessarily lie with the gun; had Mr. Maxim or one of his assistants been working the gun, probably it would have gone all right. The so-called "jam" is in ninety-nine cases out of one hundred no jam at all, but only "a stoppage" which an expert would put right in a few seconds. I will cite a little example:

Some years ago a distinguished regiment in this country had a Maxim which they were most anxious to try on service; application was made to send the gun to one of our frontier expeditions, and the Commander-in-chief replied that they might do so if the commanding officer could guarantee that his gun would not "jam"; this the commanding officer could not do, as the gun invariably stopped firing after a few rounds; would-be experts were called in, and the detachment did their best to find out what was wrong; but it was no good, the guarantee could not be given, the gun did not go, and great was the disappointment. Shortly after, however, some one suggested a simple remedy which no one had thought, or perhaps known of, with the result that the gun worked right merrily!

But I must apologize for demonstrating a matter so clear; the engine-driver must know something about engines, and, though no doubt it would be an excellent thing if a machine gun were invented which would grind out bullets as easily as a barrel organ does music, in the meantime we have got to make the best of what we have got, and, to put Maxim guns in the hands of indifferently trained men, must infallibly result in failure.

It would certainly be a great advantage to have a skilled mechanic in attendance on every Maxim gun; and, in order to get these, regimental armorers should, I think, undergo a careful course of instruction in machine guns during their arsenal course. Our civil master armorers, who preside over gun shops at arsenals, are quite competent to instruct in all matters connected with the mechanism and repair of machine guns. I do not then see why regimental armorers should not attend the practice-shooting of guns attached to their regiments, and in time of war be attached to the machine-gun detachment. For gun detach-

ments it is only necessary that two or three men, together with the officer and non-commissioned officer in charge, should know much about the gun; for these, I think, either a special machine-gun course, under a special instructor, should be arranged, say, at one of our musketry schools when the ordinary musketry classes are not going on, or the length of our present musketry classes might be extended a week or more, during which the school would be visited by a specialist who would devote his time solely to instruction in this particular branch. Either method would, I think, insure a higher standard of knowledge than that at present gained at our musketry schools, and in both cases it would be the duty of passed officers and non-commissioned officers to take charge of the guns of their regiments and instruct their gun detachments. Guns should invariably be in the charge of officers and non-commissioned officers who hold machine-gun certificates; make that a rule, and do not grant the certificates too easily, and the major difficulty of instruction is overcome. The course that I suggest would embrace (1) a complete knowledge of the mechanism of guns; (2) the causes and prevention of stoppages and "jams"; (3) the tactical uses and misuses of guns; (4) the care of guns, saddlery, etc.; (5) the elements of stable management and saddle fitting; (6) rapid laying, range-finding, experimental shooting, etc.

Equipment.—The next point to consider is equipment.

A satisfactory mounting and method of carrying guns, ammunition, etc., is a want which has long been felt. Equipments of all kinds and descriptions have been invented, but in most cases have been condemned. Whether it be wheeled carriages, pack saddles, portage, or any other kind—for even wheelbarrows have been tried—defects of some sort have condemned them. Some have been too heavy, others too light and flimsy; with some the stability has been all wrong, while others have been condemned on account of the time it took to get the gun in and out of action. I could point out several equipments which have been very nearly right, but have been quite spoilt owing to some defect. Opinions are also so very varied, and the countries in which our armies have to fight of such different character—embracing, as they do, the whole of the civilized and uncivilized world—that the difficulty of selecting a universal equipment has been very great.

And so it has come to pass that at the present time an equipment has not yet been adopted. Equipments may be divided into two classes—(1) wheeled carriage and (2) pack saddle.

Now, the first principle in the use of machine guns is that they shall not hamper troops either on the line of march or in the field, and it is perfectly certain that anything in the shape of wheeled carriage, not only cannot accompany troops in many countries, but must be a source of encumbrance and anxiety in almost any country.

Even in the plains of India, it is not an uncommon thing to see horse artillery batteries in difficulties on account of sharp scarped irri-

gation canals, or other obstacles, which led mules or horses can easily negotiate, and in the mountainous countries in which most of our frontier expeditions take place, or in heavy jungle, wheeled carriage is out of the question. In a word, wheels cannot go anywhere and everywhere, whereas it is a very strange place where lightly laden mules or horses cannot go, and I think, therefore, that it may be accepted as a *sine qua non* that machine guns should be carried on pack saddles.

Putting aside then all purely wheeled carriage—which, however, may be found useful in forts and cities—guns carried on pack saddles may be mounted (1) on tripod stands, (2) on carriages as in mountain batteries, or (3) on a light carriage and tripod stand combined; that is to say, on a tripod stand which, when required, may be put on wheels and dragged by men using drag ropes.

For universal use I am inclined to favor the last of these equipments. In very mountainous countries the wheels would not be required and might be left behind, as no dragging could be done; but, on the other hand, in most countries wheels will be found very useful to drag the gun rapidly from position to position while the mules remain under cover. I have worked an equipment of this kind for some months with an infantry regiment, and learnt the advantages of being able to put the tripod stand on wheels. Thus, in "the attack," I could unlimber under cover, and using drag ropes keep up with the "firing-line," while the mules followed on in rear keeping under cover, and, if required, could be called up by signal. It is a great advantage to have your mules under cover, and in changing position it is very much quicker to drag the gun along on wheels than to load up on mules and again unload at the new position. The use of wheels necessitates an extra mule for their carriage, but the advantages of having them outweigh, I think, this disadvantage. It is a very simple matter to adopt tripod mountings, so that they may fix on axles, on occasions when wheels are required; and, as I said before, the wheels can be left behind when they are not likely to be required.

To accompany infantry over rough hilly country, the weight of loads which mules carry is, of course, a very important matter and still more is it important in the case of machine guns carried on led horses intended to accompany cavalry. In the latter case I need hardly say that wheels are not required, and that the tripod stand alone should be carried. I may say here that the so-called galloping carriage is, to my mind, an abomination; and in this opinion, I think, most cavalry officers will agree. Sir G. Greaves once said to me: "Your beastly machine guns!—why, they would hamper cavalry," and my earnest protest that I would rather die than hamper cavalry fell, I fear, on unbelieving ears. Certainly anything in the shape of a galloping carriage would hamper cavalry, but not so led horses carrying pack loads of about 200 pounds all told, and this, I think, is approximately the right weight for machine

gun detachments, be they infantry mules or cavalry horses. With such loads active mules can accompany infantry almost anywhere, and led horses can go wherever cavalry can go. The loads must, of course, be well balanced and ride evenly; but I speak in no uncertain way, as, with an equipment I have devised, two guns we had in Tirah crawled up and down some very remarkable places, and I have taken led horses at the extended gallop over some very rough country. A led horse will, as a matter of fact, go just as well with a pack load on its back as a rider, and should the latter be an indifferent performer, a good deal better; for it must be remembered that the average weight our troop horses have to carry is considerably over 200 pounds. I find that with this equipment an infantry detachment can get the gun into action in fifteen seconds and out of action in rather less, while for cavalry it takes about twenty-five seconds to do the same, the difference, of course, being in the time it takes for cavalymen to dismount. I have never yet succeeded in getting a squadron of cavalry to dismount and open carbine fire in less than forty-five seconds, so I do not think the charge of hampering cavalry need be seriously entertained. The loads carried by mountain battery mules run up to 350 pounds, so with 200 up, machine guns should be got to places which would defy even a mountain battery.

Ammunition.—I often hear it said that Maxims will consume an enormous quantity of ammunition; quite true!—they can fire off thousands of rounds in a few minutes, but that they will do so, except under very exceptional circumstances, is to assume that officers in charge of guns are incompetent. In practice it has been found that the expenditure of ammunition is not, as a rule, excessive; and for this reason, that trial shots do not use up much ammunition, and once the range is found, a few dozen bullets usually clears the enemy out of the place fired at, and the gun has to be laid on another target. The notion that guns will go on pumping out lead in one continuous stream for many minutes together is quite a fallacy; it would indeed be a glorious target that would guarantee such a thing. In repelling an attack I can well imagine a gun getting rid of a thousand or more rounds in a very short time, and the same might occur at the crisis of any fight; but, with an officer standing over the gun and regulating the fire, we may generally assume that ammunition will be judiciously expended. Two mule loads—*i. e.*, 4000 rounds in belts—is, I think, sufficient to carry with a gun, another two mule loads being with the regimental reserve ammunition.

There are, of course, many other questions of equipment which require solving, for instance, the carriage of water for the gun, spare parts of mechanism and tools for repair, range-finder, reloading machine, etc., etc.; it is also important that selected mules be provided, together with efficient drivers, as in mountain batteries. But space forbids that I should go into these matters here. Suffice it to say, there is no insurmountable difficulty in the production of an equipment which would satisfy our soldiers and meet the requirements of active service.

Organization.—The organization of "machine guns" should, I think, be on very much the same lines as "army signalling."

The guns, including mules, saddles, etc., to be in regimental charge, both in peace and war, and to form a portion of regimental equipment, which, with the gun detachment, should be periodically inspected precisely as regimental signalling is done. Commanding officers cannot be expected to do this for machine guns any more than for signalling and for the same reason. It is only by some such method that a high standard of efficiency can be maintained.

The best strength for a Maxim gun detachment—men and mules (infantry) and men and horses (cavalry)—is a much debated question. Personally I think an infantry detachment, using pack saddle equipment, should consist of from four to six mules and six men, and a cavalry detachment of three to four led horses. But this is too lengthy and technical a matter to discuss here.

The smallest detachment I recommend would consist of—

One mule, carrying gun and tripod mounting.

Two mules, each carrying 2000 rounds (.303) in belts.

One mule spare.

Total four mules and 4000 rounds ammunition.

Should wheels be carried, add one mule.

This small detachment would cause little inconvenience to an infantry battalion; indeed, two such detachments, giving a total of eight to ten mules and twelve men (exclusive of drivers), would not, I think, be an excessive complement. In addition to the above, two mule loads of ammunition, *i. e.*, 4000 rounds per gun, should go with the regimental reserve ammunition.

But the question of ammunition has already been discussed, so I may pass on to drill and tactics.

Tactics.—The tactical use of machine guns is very simple. It is a weapon of opportunity—a concentrated musketry fire on a given objective, and any officer or non-commissioned officer, who is a bit of a "musketry man," and whose ideas are sound on the employment of musketry fire, should find no difficulty in making an intelligent use of machine guns.

A wise commander will always give his machine guns great latitude of action. At Suakin, where I worked a Maxim gun for some months with an infantry battalion, we found it best for the regiment to manœuvre as usual without taking any notice of what the gun might be doing; that to leave gaps for the gun in lines or squares was a mistake, and not only complicated infantry drill and was most annoying to company officers, but might even lead to disaster in the case of a gap left at the corner of a square and the gun not turning up to fill it. We found it much better to fall a couple of files to the rear wherever the gun commander thought best to stick out the nose of his gun. At first there was much discussion as to the proper place for the gun, and various

rules were made for its place both in drill and manœuvre. The result was that it was seldom where most required, was usually in somebody's way, and was generally voted a nuisance. In the end we found it very much better to leave everything to the discretion of the gun commander, and, so long as he did not get in the way or interfere with the movements of the regiment, allow him to "cut in" when and where he thought best. There are, of course, occasions when it is necessary to give special orders to the gun commander; but, as a rule, the more he is left to his own devices the more likely is he to use his own initiative and common sense, and to produce his gun when and where most required; with a free hand, both the gun commander and the men under him will take the keenest pride in the successful handling of their guns.

I deprecate the placing of machine guns in skirmishing lines, preferring to see them close at hand under cover, from whence they can be called up when a target worthy of their notice presents itself. Gun commanders should keep well ahead, forever on the lookout for a chance. Fire being of very little use unless accurate, and the difficulty of getting the range being considerable, positions should be changed as seldom as possible after the range has been found. There is, however, one notable exception to this, and that is, when guns find they are attracting artillery fire: in this case the sooner they move on the better, for to allow artillery to get the range would probably spell annihilation. A few changes of position upsets artillery fire so much that I do not think machine guns are likely to suffer from it to any great extent; moreover, artillery will usually be employed in firing at some larger target and isolated machine guns firing smokeless powder, and for the most part under cover, will seldom attract artillery fire.

It takes some time to select a position and get the range, and in the meantime our infantry may have advanced and passed the machine guns which may then have to fire over their heads; there is, I think, little danger in doing this—certainly not more than when artillery fire over infantry with the off chance of a "premature." Indeed, with an officer or selected non-commissioned officer laying the machine gun and knowing all about the trajectory table, the danger to advancing infantry may be considered as practically *nil*. I think that occasions may arise when machine guns will, in the future, be used for long range fire to cover the advance of infantry. I do not say that all the guns of a force should be employed for long range fire, but a proportion of them might, on many occasions, be detailed for this duty, while the remainder push on with their battalions. In the same way, in the defense of a position, a certain number of guns might be used for long range fire, while the rest remain masked till the enemy reach landmarks, the ranges of which have previously been taken. The value of long range volleys is, to say the least of it, problematical—especially so the volleys of men themselves under fire. As a substitute for long range

volleys, I should employ machine-gun fire, which is not only very much more accurate, but would also enable the men to go into action with their pouches full. But, as I said before, no hard-and-fast rules can be laid down for the use of machine guns any more than for the employment of musketry fire. The principles of musketry are, for the most part, those which must guide us in the use of machine guns; common sense and experience must do the rest.

I picture to myself the artillery on both sides engaged in pounding one another; our infantry advance to the attack; machine guns are dodging about with the advance, taking what cover they can find, and looking for useful positions and good targets; as each gun finds a position, it opens with trial shots; those that get the range remain where they are, and fire over the heads of our advancing infantry; others push on with the attacking force, watching and waiting their opportunity. Our infantry open fire, and the enemy reply aiming rather at the advancing lines than at the little guns, for the most part out of sight; but the little guns are gradually getting the range, for they can see the strike of a dozen bullets in one place and have range-finders to assist them. The fight develops, and the fire on all sides is incessant, and for the most part unaimed; the crisis approaches, and one side or the other must certainly give way in the next few minutes; most of the machine guns have, by this time, got the range; others have crept up into the firing line; they let themselves go, and at the critical moment of the fight pour an accurate and continued hail of bullets on the enemy, while our infantry push home the attack with the best result.

The Tirah Campaign was a singularly unfortunate one for machine-guns. The enemy were dotted about in twos and threes, and seldom gave the Maxims a chance. The same, however, may be said for our infantry, and to this day it is a matter of speculation what the enemy's losses really were; on only one occasion did we catch them in any numbers in the open, and then there were no Maxims present. Employed against skirmishers under cover, machine guns will be found of little use: such, at any rate, was our experience in Tirah, and also, I believe, in Chitral and Jameson's Raid.

But, as I have already said, this is not their rôle, and no action worth mentioning has ever been decided by skirmishers. They will, however, be found useful to cover the retirement of infantry from the crest line of hills, and have on occasions been effective in clearing out sangars. Skirmishers must be left for infantry to deal with, while the guns lay in wait for bigger game. Gun commanders must be patient; if it is anything like a fight, they will surely find a target sooner or later, and then it is their own fault if they do not make their presence felt.

I will not touch on the use of machine guns in forts or field works, or for the defense of camps, bridges, roads, laagers, squares, etc., etc.; their uses on such occasions are too well known to bear comment. It is,

however, not generally known that by a simple method, I need not here describe, guns can make accurate shooting at night on any number of spots, say, approaches to a camp, the ranges of which have been taken during daylight.

With Cavalry.—For cavalry it is sufficient to say that machine guns may be used as a supplement to, and sometimes as a substitute for, carbine fire.

Most cavalry officers will, I think, agree that dismounted fire is, in the present day, very often overdone, and that the true cavalry spirit is consequently in danger. Continental cavalry, with the exception of the Russian, are very particular on this point. The perpetual jumping off and on horses to fire a few rounds, and then galloping off to look for another position, or to get behind cover, is a perfect disease in some regiments, and most detrimental to a proper cavalry spirit. Were a few machine guns attached to cavalry, this danger would be eliminated. On most occasions, when dismounted fire is employed, a machine gun would not only do the work much better, but would also leave the cavalry to perform their more legitimate mounted duties, and we should then see less of cavalry spending their time in doing the work of mounted infantry. While at Suakin, we tried a Maxim gun on led horses with the 1st Bombay Lancers, and I usually manœuvred it like a horse artillery gun—galloping forward and to a flank and opening a rapid fire as the cavalry swept past to, alas! an imaginary attack.

To do this satisfactorily, every second is of importance, or the advancing squadrons will be past and, perhaps, screen the fire of the gun; but by the latest methods guns can open fire in from twenty to thirty seconds from the halting of the gun detachment, and this will usually suffice to get rid of a few hundred rounds before the fire becomes screened.

As a supplement to carbine fire, machine guns will, I think, form a substitute for mounted infantry and to a lesser extent—though I admit a poor one—for horse artillery. There is no doubt that there are many occasions when a heavy rifle fire would add very much to the power of cavalry; carbine fire is weak and usually inaccurate—a thing which cannot be said of machine guns.

I see, in my imagination, a great fight, say, in the Soudan; the enemy have failed to face our fire and are in full retreat, and followed by long range volleys; our cavalry is let loose, but is too weak in numbers to attack thousands of spearmen still full of fight; a couple of cavalry Maxims gallop to an eminence which commands the retiring mob and pour in such a fire as converts the retreat into a terrified flight, and then our cavalry cut in, and—well, the curtain may now drop.

Are these things possible, or are they merely the phantasy of an optimistic enthusiast? Mind, I do not say that machine guns can do everything, but only that they may be found, on occasions, very useful,

and that the possibilities for them are very great. Men's nerves will always be against accurate rifle shooting, and the more men are fired at the more "jumpy" they become, and the worse is their shooting.

What a distinguished author describes as the "catalepsy of fire" when men become so worn out and tired that it matters little whether they carry magazine rifles or pitchforks, is a condition which is not likely to affect machine guns, and these are the very occasions on which their presence will be most felt.

I believe that these things are not only possible, but that in the near future we shall see them realized; that is, if—as usual all depends on that little word "if";—well, it does not seem much, if machine guns are put in the field properly equipped, and the men who use them are thoroughly instructed,

We may then see a not inappreciable adjunct to the fighting power of our troops, and then and then only will Lord Wolseley's prophecy be fulfilled.

MACHINE GUNS: THEIR USE AND ABUSE.

By AJAX.

(*The United Service Magazine, London.*)

IN the course of the following pages, I propose to discuss the use and abuse of machine guns in warfare, and to compare, as far as possible, the results of their fire with infantry. I shall first call the attention of my readers to the tables here inserted, and try and deduce from these statistics certain facts. These experiments were conducted at Hythe some few years back, and as I was superintendent at the butts, laid out the positions, and counted the hits, I can vouch for their accuracy. The positions were marked by dummies placed as on service, but the ground taken up by the sections firing was not very suitable for machine guns, as their wheels had to rest on shingle, forming a very unsteady platform.

We will first consider Table I. In this table the infantry, in two sections of seventeen men, fired 256 rounds in the minute (firing rapid volleys). They made 7.31 per cent. of hits, and created a loss of 16.37 per cent.; whilst the Maxim fired 118 rounds, made a percentage of hits 7.62, and effected a loss of 7.75. The conditions under which they fired were precisely similar, and the non-commissioned officer in charge of the Maxim was thoroughly proficient in his work. Yet here, at a stationary target, the infantry fire more than doubled the casualties caused by the machine gun. It is interesting to notice that the trajectory of the bullet of the Lee-Metford was so flat that the supports behind the shelter were practically untouched, whilst the firing line in the trench (placed showing their heads and shoulders as in the act of firing) suffered severely. It is the custom to allow 1-20 of the casualties obtained in

I.

OBJECT OF THE PRACTICE.

The value of Infantry and Maxim Gun fire on 3 guns with escort of 68 men, exposed to view for one minute.

Results of Infantry Fire.

OBJECTIVE.

	No.	Height.	Frontage.	Hits.	P. C. of Losses.
Firing line.....	68	19 in.	60 yds.	12	17.64
Supports.....	30	2 ft.	60 yds.	1	3.33
Guns, 3.....	—	4 ft. 6 in.	16 yds.	0	—
Limbers, 3.....	—	5 ft.	16 yds.	1	—
Gunners.....	18	2 ft. 6 in.	—	5	27.77
Total.....	116			19	16.37

Results of Maxim Fire.

OBJECTIVE.

	No.	Height.	Frontage.	Hits.	P. C. of Losses.
Firing line.....	68	19 in.	60 yds.	0	—
Supports.....	30	2 ft.	60 yds.	4	13.33
Guns, 3.....	—	4 ft. 6 in.	16 yds.	2	—
Limbers, 3.....	—	5 ft.	16 yds.	0	—
Gunners.....	18	2 ft. 6 in.	—	3	16.66
Total.....	116			9	7.75

No. firing. Rounds. Hits. P.C. of hits.
 34.....256.....19.....7.31

Gun. Rounds. Hits. P.C. of hits.
 Maxim.....118.....9.....7.62

Distance.....700 yards.
 Position.....Kneeling.
 Nature of fire.....Volleys.

Weather.....Good.
 Light.....Fair.
 Atmosphere.....Dry.

Wind, force.....Strong.
 Barometer.....30.08.
 Thermometer.....57°.

peace time to stand as the actual loss in war, so on this occasion the guns and escort would have suffered no casualties, and the gunners one, and I think that this would have been a very likely result; as, with the field guns firing at infantry from a distance of 700 yards, the infantry fire would probably be wild and ill-directed.

II.

OBJECT OF THE PRACTICE.

The value of Infantry fire at 3 guns with escort of 68 men, exposed to view for one minute.

Target.		Hits.	P.C. of losses.
Infantry.....	3 guns, 4 ft. high	10	—
	68 men, 1 ft. 6 in. high.....	10	14.70
	18 gunners, 2 ft. 6 in. high	22	122.22
Total....	86	42	37.20
Maxim	3 guns, 4 ft. high	3	—
	68 men, 1 ft. 6 in. high.....	0	—
	18 gunners, 2 ft. 6 in. high	1	5.5
Total....	86	4	1.16

Nature.....Infantry fire, rapid magazine volleys.
 Position.....Lying down, single rank.
 Distance.....900 yards.
 Weather.....Wet.
 Wind.....Strong, right front.
 Light.....Bad, misty.
 Barometer.....29.28.

In Table No. II we have the same description of target, but the attackers had retired two hundred yards, yet they inflicted a heavy loss on the gunners, who were necessarily much exposed when working the gun. The Maxim practically failed to find the object. Its fire was going high, and the shelter trench prevented the non-commissioned officer from seeing the ground beyond when the dust was flying.

In Tables III and IV we have the infantry and machine guns firing on infantry advancing in attack formation, in view for one minute. These tables are interesting, insomuch as they show how the skirmishers, who were advancing by alternate halves, were severely handled (although only showing nineteen inches), whilst the supports, who were able to keep under cover, as a rule, suffered but little.

We have up to this been considering the results of fire on stationary objects, and much surprise was felt at the superiority of infantry fire over the machine gun. Let us try and find some excuse for this. I

III.

OBJECT OF THE PRACTICE.

To show the value of Infantry and Machine Gun fire on infantry in attack formation in view for one minute.

Target—2 companies.

OBJECTIVE.			RESULTS OF								
	No.	Height.	Frontage.	INFANTRY FIRE.		MAXIM FIRE.		NORDENFELT FIRE.		GARDNER FIRE.	
				Hits.	P.C. of Losses.	Hits.	P.C. of Losses.	Hits.	P.C. of Losses.	Hits.	P.C. of Losses.
Skirmishers.....	136	19 in.	60 yds.	27	19.85	10	7.35	—	—	3	2.20
Supports	72	2 ft.	60 yds.	8	11.11	2	2.77	7	9.72	—	—
Reserves.....	60	—	60 yds.	—	—	—	—	—	—	—	—
Total.....	268	—	—	35	13.05	12	4.47	7	2.61	3	1.11

INFANTRY.			MAXIM.			NORDENFELT.			GARDNER.		
No.	Rounds.	Hits.	P.C. of hits.	Rounds.	Hits.	P.C. of hits.	Rounds.	Hits.	P.C. of hits.	Rounds.	Hits.
300	230	35	15.21	175	12	6.85	165	7	4.24	65	3
			Distance.....	750 yards.							
			Position of Infantry.....	Kneeling.							
			Weather.....	Good.							
			Wind, force.....	Moderate.							
			Light.....	Fair.							
			Barometer.....	30.08.							
			Thermometer.....	57°.							

IV.

OBJECT OF THE PRACTICE.

To show the value of Infantry fire even at long range on Infantry in attack formation, in view for one minute only. Also to compare Infantry fire with that from machine guns firing for the same length of time at the same objectives.

Target—2 sections; one lying down, one in support.

Objectives.		No.	Hits.	P.C. of losses.
Infantry, 38 men fired 380 rounds....	Firing line....	29	30	103.44
	Support.....	17	14	82.35
P.C. of hits, 11.57.	Total....	46	44	95.65
0.303 Maxim fired 233 rounds.....	Firing line....	—	0	—
	Support.....	—	4	23.53
P.C. of hits, 1.71.	Total....	—	4	8.69
0.45 Nordenfelt 3-barrel, fired 243 rounds.....	Firing line....	—	11	23.91
	Support.....	—	6	13.04
P.C. of hits, 6.99.	Total....	—	17	36.95
0.45 Gardner 2 barrel, fired 193 rounds.....	Firing line....	—	4	13.79
	Support.....	—	0	—
P.C. of hits, 2.87.	Total....	—	4	8.69

Nature Infantry, rapid, magazine volleys.

Position Lying down, single rank.

Distance 900 yards.

Weather Wet.

Wind Strong, right front.

Light Misty.

Barometer 29.28.

think it is that, firing at an object scattered and ill-defined like a company in attack formation, machine guns concentrate the fire too much; whereas, in two sections of thirty-four men, some are sure to aim at a different portion of the enemy, and by slight difference in sighting or aiming to scatter the fire high and low, so as to cover the area of the ground covered by the attacking troops with a steady though rather scattered fire, whereas the slightest movement of the wheels or working of the shafts into the ground will throw the aim of the machine gun off, and the shots will follow one another badly directed as regards elevation and direction. This working of the shafts into the ground necessitates re-laying after every twenty or thirty rounds, if good results are to follow. The movement of the hand-lever in the Nordenfelt and crank-handle in the Gardner also utterly disconcerts the aim, unless the No. 3

On both these occasions the results of the shooting with the Maxim gun was far behind that of the infantry. I think that any one who has had any experience with these guns will agree that it is almost impossible to follow a moving object with them unless the object is crossing straight across the front. I will now ask my readers to follow me, and consider the employment of machine guns in the field. During the late Tirah war, I was for four months in charge of two Maxims, which were converted from wheel carriage to tripod mountings, so as to enable them to go over the difficult ground traversed by the troops in that campaign. Although the mountings were made in the Public Works Department smithy at Parachinar with the materials at hand, and no lathe, and of no sealed pattern, yet the detachment could bring the gun into action in seventy seconds from the time of the word of command ("Action") to the firing of the first shot. In the camp at Sadda they were very useful, as they swept the front of two faces, and could enfilade the third. I found the mules could go anywhere where a British soldier could go, and only once did we have to unload them, as the legs of the tripod would not go in between two large boulders stuck in the goat path cut on the side of the khud, near Thabbi.

I think, therefore, that the Maxims, on good tripod carriages, which, at will, could be converted into wheel carriages, might go anywhere. Whilst at Parachinar, I saw long baskets, in which the Gurkhas carried their Maxims on their backs over the worst ground and up the steepest precipices. But I do not think that the country or the nature of the enemy was at all suited to the Maxims. The mules carrying the gun and ammunition form a very large target, and are always singled out for a large share of the enemy's attention. The amount of ammunition that the gun will fire when directed against skirmishers on the rocks will be out of all proportion to the loss inflicted. In fact, I looked upon the effect of the Maxim fire on most occasions as merely preventive, as it enabled troops to be withdrawn from picket duty without loss. I do not believe that the enormous amount of ammunition required, the increase in transport necessitated, will compensate for the damage inflicted by the guns in frontier warfare. At Gulistan, on the Malakand, they would, no doubt, have been invaluable, as the fanatical Swat tribes charged right home.

Again, I think that machine guns should be brigaded under one officer, and not follow the regiments to which they belong. I remember on one occasion seeing the companies of a regiment, during the march down the Bara valley, sent off one by one to picket the heights, until at last no one was left but the machine-gun detachment, who forthwith attached themselves to the nearest mountain battery—a very good place for them, as they were enabled subsequently to obtain the range to the enemy's sangar, and do good work.

I consider that officers commanding machine-gun sections do not realize the fearful waste of ammunition that they lend their countenance

to, ammunition which they may badly want at some crisis; ten or twenty rounds at a time is all that should be fired; the gun should then be relaid, and the result of the fire noted. This question of ammunition, I consider, is one that affects machine guns to a very large extent, and those in charge should pause and consider whether the expenditure of the ammunition will compensate for the damage inflicted. It is not the question of cost; it is the question of transport and reserve.

To sum up, I consider that the employment of Maxims on the march in a mountainous country is not worth the transport and ammunition required; that, if they are employed, mule transport is the only feasible one, and the carriage should be a tripod mounting, convertible at a moment's notice to a wheel carriage, for movement about bivouacs or the attacking line. The question of carriage is a very important one, as it must be portable, not too heavy, and yet possess great rigidity, whilst the fewer split pins, screws, and nuts it has the better; it must have elevating and scattering gear, and must be simplicity itself. Tricycles I think wholly unsuited for machine guns. I would like to see all the guns issued to infantry regiments adapted for mule transport, so that at any moment they could leave the road, go through a gap in the hedge, and take up a position on the worst ground. When not required, the mules would be useful for ordinary transport work. Multiplicity of patterns is a mistake in all ordnance and carriage.

In camps (standing or temporary) the machine gun is invaluable; through a longitudinal loophole it can sweep the whole front of a camp, and on wheels can be moved to any quarter in a very short time; loaded and laid before nightfall, it will cover the ground for 400 or 500 yards to the fort with a withering fire against which no one could stand. In the dead angles of forts, blockhouses, and fortified posts, its presence would add quite thirty rifles to the defense without having to be added to the ration return.

I think people are apt to put too much faith in machine guns, and to attach to them an undue importance, imagining that they are fitted for every occasion and in every position, but that they are not I feel sure; affording a large target to the enemy, expending an enormous amount of ammunition, their rôle is in "positions," their tactics defensive. Do not express surprise when you read that the enemy's loss amounted to twenty, whilst the Maxim fired 3000 rounds; perhaps it saved many of your own men's lives, and in all probability the gun was put in a wrong position, and directed against a target utterly unsuited to it.

Military Notes.

TACTICAL INSTRUCTION FOR THE GREAT MANŒUVRES IN FRANCE, AUTUMN, 1898. TRANSLATED BY CAPTAIN HENRY T. ALLEN, U. S. CAVALRY.

(Hamburger Correspondent, May 19, 1898.)

GENERAL NÉGRIER, an army inspector, who will have charge of the manœuvres of the VIII. and XIII. Corps, has issued special instructions which in many respects are at direct variance with the regulations. These instructions require that for attack the divisions of a corps be deployed, not on the same line, but one behind the other, also that to the main reserve of the commanding general artillery be assigned. At this time when such great importance is attached to the preparation of the attack by the rapid fire artillery, in order if possible to dominate the opposing artillery, this use of field-guns must be considered a mistake.

Each section of the battle front is to have its own reserve to which are to be attached 1-2 troops, and the leader of the reserve is to attack when he judges fit.

The infantry is to fight in skirmish lines each one platoon strong, but their depth will depend upon conditions. Platoons follow the skirmish lines as supports (such is no longer recognized by the regulations), at a distance of 50 paces and join the same only when they are thrown on the fighting line. Small columns follow the skirmish lines at 300-500 paces; the companies are one behind the other. The 16 *éclaireurs* per company according to regulations are to be replaced by individual *éclaireurs* which are to be employed as combat patrols.

Sharpshooters are to remain lying 300 metres from the enemy until the reserves approach, then a rapid advance to within 50 metres of the enemy is to follow.

For large reserves small fronts are recommended, because in such formations the accident of the ground can be better utilized.

At every halt the troops are to lie down. The volley is absolutely forbidden. In the attack fire should not be opened at a greater distance than 600 metres, to which distance rapid advances should be made.

In the defense fire should be begun as soon as it can be made effective.

For the most part the artillery will not fire at a greater distance than 2400 metres.

The author of this article doubts whether French infantry can be brought to within 600 metres of a firing line without answering the fire. He also thinks that the 18th of August, 1870, answered decisively some of the proposed experiments of General Négrier.

REPORT OF THE CROWN PRINCE OF GREECE.

TRANSLATED BY CAPTAIN HENRY T. ALLEN, U. S. CAVALRY.

(From the Kölnische Zeitung)

This report appeared shortly before the departure of the Crown Prince for Germany. It depicts with utter frankness the disordered condition of the army. At the time the superior command was assumed by the prince, the tactical formations were not considered deep enough, and in consequence changes were at once ordered in the different commands; these were, however, not completed when hostilities began. Major General Makris is severely criticised because he made no effort to retake Melonna Gritzowali, in spite of explicit orders of the Commander-in-chief, before the arrival of Turkish reinforcements. Makris' conduct is characterized as insubordination of the worst kind. On account of the urgent dispatches of the Crown Prince the former felt aggrieved, sent in his resignation as well as that of his chief of staff by heliograph, gave over command of his division to Brigadier General Mastraps, rode to Larissa in sight of the enemy at the head of a detachment whose lack of discipline from the beginning caused apprehension and which now, owing to the action of its highest officer towards the Crown Prince, was more marked than before.

The battle at Delere, which was connected with this event, was lost because the commanders at Kritiri and Karatzoli sent no reinforcements to the scene.

The retreat from the frontier to Larissa was ordered by the division commanders at their own initiative. The entire retreat was pitiable, the panic indescribable; it was clear to the Crown Prince that a halt at Larissa was out of the question.

The complete want of rations and forage for man and beast, and the absence of all kinds of supplies played a great part in subverting discipline.

At times during the periods of 2-3 days the soldiers did not receive even hard bread, and when they did receive it there was often no water to soften it.

At Pharsala the motley army inspired no confidence in its leader. As the outposts took the rustling of the wind in the corn fields for the approach of the Turks and retreated without any command, it was decided to retire on Domokos.

The recall of Sapuntzakis, whom he estimated as a most intelligent and skilful officer, embittered the Crown Prince very much, as he considered it a censure of his course.

At the battle of Pharsala there were again fatal misunderstandings. For example, a brigadier-general ordered an artillery major, who had already received an order from a division commander to hold a hill in rear of the Greeks, and from there by means of a vigorous fire, to support the movements of the infantry. It is due to the skill of a few officers that a real resistance was made at certain points of the retreat and that the enemy was at all checked.

The division of Smolenski came directly from the railway to Volo, but could not here resist the first onslaught of the Turks and was compelled to retire to the heights of Velestino.

The two battles of the 22d and 23d of April took place here under the direct supervision of the Crown Prince, as a result of which the advance of the Turks upon Volo was successfully repulsed. Even the personality of Smolenski could not prevent the retreat towards Almyros in disorder.

The artillery especially went back in great confusion and the officers were often compelled to take the place of fleeing cannoniers.

The pioneers retreated in order as did the greater part of the Seventh regiment—the only infantry regiment that in a certain measure did its duty, and therefore had the most losses. Domokos, a place favorably located by nature, was well fortified by the pioneers; with harmonious management and obedience to instructions to strengthen the right flank, the place could have been held. The ministry at Athens had more confidence in Smolenski than in the Crown Prince and authorized him to obey only such orders of the latter as he judged expedient although he (Smolenski) was not at Domokos but at Almyros.

The retreat from Domokos took place on account of the superior numbers of the enemy, but not until the right flank was turned and the entire army was threatened with capture. In general the conduct of the troops at Domokos was good; the foreign legion and the corps of Garibaldi were specially good.

The report concludes with an estimate of the different branches. The infantry was not sufficiently trained or disciplined; the same was true of the cavalry, which in peace time had been used for all kinds of purposes. The pioneers did their duty both with weapons and tools. The officers of the artillery were capable, but the men were only theoretically instructed. The supply department and trains were wholly insufficient and badly organized; the sanitary corps, be it said with shame, was rarely in its place. Of the three telegraph lines but one worked properly and the secrecy of dispatches was by no means guarded.

The leading of the troops in battle was not based on strategic principles as connected with the terrain; the commanders rather followed out mechanically the original plans—either because they did not recognize the advantages of the ground or because they did not know how to profit by them.

THE NEW FIELD-PIECE FOR THE FRENCH ARMY.

For the past five years, the French government has been making experiments with rapid-fire field-pieces. Although the experiments were secretly performed, the French press so early as 1894 was busily engaged in proclaiming to the world that their government contemplated the introduction of a new rapid-fire field-piece.

The new field-piece has a calibre of 7.5 centimetres (2.95 inches). The gun is made entirely of nickel-steel and is provided with the usual

breech-closing mechanism. The piece is sighted and fired by a man who sits at the side of the gun-carriage. In action, the gun is first roughly trained on the target by an artilleryman who, by operating a hand-spike on the rear portion of the trail, turns the whole piece to the right or to the left; the finer adjustments are made by turning the gun itself on the carriage.

When a projectile is discharged from the gun, the carriage shows a tendency to recoil. In addition to this, the gun itself slides back on the carriage, but is returned to its initial position by a recoil-cylinder. A similar system of hydro-pneumatic recoil-cylinders is also applied to the 12 centimetre (4.724 inch) field-howitzer. In order to counteract the recoil of the carriage, a strong spade is secured to the rear end of the trail, which spade after the first few shots have been fired embeds itself firmly in the soil, and thus prevents the carriage from changing its position.

The rapidity of fire of this piece depends chiefly on the use of fixed ammunition, the automatic return of the gun to its original position and on the possibility of simultaneously loading and sighting the piece. Ordinarily the gun can fire five shots per minute, and if ammunition could be served quickly enough, twenty shots per minute.

The projectiles used are explosive shells filled with melinite and double-fused shrapnels containing about 250 lead balls. The shrapnel explodes at a short distance from the target, scattering the lead balls to each side. This scattering is increased by turning the gun from side to side while firing, a movement which has been likened to the action of a scythe and which has hence been termed *faucher le terrain*.

Two shields, one on either side of the gun, protect the cannoneers. The caisson has but two chests, instead of three as in the older models; one chest is on the limber and the other, a much larger one, is on the rear axle. Both these and the gun are set low.

The gun has a preponderance, the gun-carriage is longer and the distance between the gun-wheels and those of the limber is greater than in the old model.

All the carriages are painted a grey-blue.

Eight of these pieces appeared at Châlons during the September manœuvres. These were divided into two batteries, and a recent article from the French claims that four is henceforth to be the usual number of guns per battery, both on a peace and a war footing. The same journal claims further that four of the new guns are much more deadly in their effects than six of the older and larger models.—J. C. B.

ARTILLERY IN THE EGYPTIAN CAMPAIGN.

Artillerymen will be pleased to learn that the breaching power of the Lyddite shells fired from the howitzers on the citadel of Omdurman proved to be enormous. The wall was a solid stone structure, 10 feet high by 4 feet thick, built of material brought from dismantled Khar-toum. The accuracy of the howitzer fire is attested by the absolute

havoc which was made of the Mahdi's tomb at great ranges. The battery to which reference is made in the above paragraph from the *Army and Navy Gazette*, was armed with 5-inch howitzers firing 50-lb. shell filled with the new explosive "Lyddite," states the *Journal R. U. S. I.* The guns were drawn by mule teams led by Egyptians, and the equipment is so arranged that each mule carries four shells into action.

THE RECENT FRENCH MANŒUVRES.

The *Armée Territoriale* has given some suggestive opinions upon the recent manœuvres between the Loire and the Allier directed by General de Négrier. It was in these operations that the special ideas of the general were put to the test, for General Jamont, in the east, merely set himself to perfect the accepted method—disperse to live, concentrate to fight. General de Négrier had prescribed that the object of the movement being indicated, the greatest latitude was to be left to the men in the utilization of the ground. "All troops halted must immediately lie down, and the men must be made to understand that their losses will be smaller according as they occupy less space upon the ground." M. Grégoire, of the *Gaulois*, is of opinion that, in the spirit of these instructions, the manœuvres showed great progress in the utilization of ground during the advance. Accidents of the land, hedges, woods, hillocks, and all points that could give shelter were carefully seized upon. The reserves were to take their formation in column with narrow fronts, which would enable them to gain shelter in the hollows of the ground, and to avoid rapidly the effect of regular artillery fire. M. Grégoire admits that these various orders have contributed to progress by favoring what he calls a "constant offensive," but he is doubtful about the famous *essaims* or "swarms" of General de Négrier, which were intended to do away with regular alignments and rigid formations. He saw little of these "swarms," and seems inclined to believe that, either by training or habit, officers and men held to the regular formations. As to the *feux par rafales*—firing in short and violent squalls or gusts instead of by volleys—directed by the whistle, he says he saw much more of firing at will, whereby the idea of the director was lost, and the question of waste of ammunition became serious. He protests that much clearer light is wanted on this matter.

For the cavalry M. Dumazet, in the *Figaro*, has the highest praise. It was not spared, and he saw with pleasure that the whole of the cavalry threw itself well into the work of exploration, which has sometimes been despised. The search was intelligently done, and the cavalry screen covered the troops well, though he regretted that greater opportunity was not given to Generals de Boysson and Briois. The ground was atrocious, broken up by huge ridges and deep hollows, and, where it was sandy, the top baked by the heat into a hard crust, through which the horses broke, causing many serious falls. M. Grégoire says the cavalry never did so well, and that it was the special impulsion of General

de Négrier that launched it with vigor into indefatigable action at every opportunity, and sometimes when there was none. In such matters, said a prominent cavalry officer, it did not do to be too critical upon matters of detail or errors of execution. The great line, he observed, must be noted, which is the active and fighting rôle of the cavalry, and not merely that of exploration, and of screening the advance, which at one time a school, badly interpreting the lessons of 1870, preached as the sole function of the arm.

As to the artillery, we have already quoted the high opinion expressed by the *Progrès Militaire*. M. Dumazet remarks in the *Figaro* that this is a time of transformation in the arm, but that it has answered the highest expectations, and has maintained all its traditions. Frenchmen were already accustomed to its sudden appearances and its swift taking of position. Many amateur critics have censured the artillery duels at short range, but, says M. Dumazet, in manœuvres, where the operations of one or two hours simulate the phases of a battle of one or two days, it must always be so. What has to be recognized is the extraordinary suppleness of the artillery on the march and in its formations. Nothing stopped it, neither ridges, nor ditches, nor hedges. All critics are united in praising the endurance and hardihood of the men.

A military correspondent of the *Times*, in a letter published on Tuesday, speaks very flatteringly, but by no means too highly, of French troops he saw lately at the manœuvres near Moulins. To quote the words of the writer:

"For the infantry, carrying their heavy packs, to march under a blazing sun the extraordinary distances they did without there being any perceptible falling out, much less a total breakdown; for the cavalry to manœuvre over the difficult and cramped country with scarcely an empty saddle—these performances point to a state of efficiency which any general might well be proud of, and which can only be the result of the most minute and careful training."

All eye-witnesses seem to be agreed as to the excellent condition in which the manœuvring forces were found. A private correspondent assures us "that he never saw French troops to better advantage; everything was as good as it could be, and the spirit of the men beyond praise." Much interest has been taken in these manœuvres on account of the practical test to which the new system of infantry attack was to be put. The *Times* correspondent was not so impressed by what he saw of this. He says:

"Whether all military critics will look with favor on the latest tactical ideas as regards the infantry attack is a matter of doubt; and it can hardly be said that General Négrier has, as yet, succeeded in winning over to his new system all those who were following the manœuvres. This system, which I have seen described as the *essaim rafale*, is, briefly to overwhelm the enemy with independent but controlled fire while gradually massing for the final effort, reinforcements being

brought up generally in fours and thrown into the firing line by forming to the front wherever there is a gap. There is no doubt that volleys, owing to the waste of valuable time, have fallen into complete disuse on the Continent of late; but it has yet to be proved that through the excitement and deafening rattle of independent fire any control worthy the name can be exercised, either over the direction or expenditure of ammunition. The reinforcing was extremely well done, the company being led to the right spot."

A new idea of the director's, we are told, was to make the cavalry charge home, one squadron passing through the other instead of the conventional halt some distance apart. They steadied up very considerably on nearing each other, and the squadrons opened out, "but even then a man must have often needed all his wits about him, and perhaps a little luck, to avoid getting into difficulty." A noticeable feature about the artillery, we read, was the extraordinary way the teams were left exposed right behind the guns, no attempt being made apparently to get cover. This was not done here and there, but was invariably the case, and was the subject of much comment, as it was expected after the first day that the matter would receive the attention of the umpires. In his concluding paragraph, the *Times* correspondent pays the highest compliment to the troops:

"On every one who has been privileged to follow these manoeuvres they cannot have failed to have made the very greatest impression. Gen. Négrier's two army corps at Moulins may be taken as a sample, neither above nor below the average of the whole army, but two corps that any general might well be proud of—and behind these two stand eighteen more."—*Army and Navy Gazette*.

THE EFFECT OF THE NAVAL GUN-FIRE AT SANTIAGO.

It is now possible to measure clearly the influence of gun-fire during the naval encounter at Santiago, for the four Spanish ships have been carefully examined to determine the damage done by the respective calibres of guns, and one decision come to by the United States naval authorities is to have no gun of less than 3-inch calibre, and probably there will be fewer of over 8- or 10-inch calibre. The four ships received 123 hits. They were unequally distributed, the *Oquendo* getting 57, or almost as many as the others put together, but this was due to the execution of the 6-pounder guns rather than those of greater calibre. There were eight 13-inch guns actually in action, and not one shot took effect. Again, six 12-inch guns were in action, and only two shots were effective, striking the *Infanta Maria Teresa* just above the water-line abaft the after turret. One passed right through the armored bulkhead to the other side of the ship, perforating the skin there also. These guns are much slower in their fire than our latest 12-inch weapon, for the latter can be fired from any position of training or elevation, instead of being brought back to the normal fore and aft level condition. The gun can thus follow the enemy while each charge is being run home,

and, moreover, every operation is performed by beautifully balanced mechanism.

The 8-inch guns in the Santiago fight helped to settle the fortunes of war. Of these guns eighteen were in action, and yet only twelve blows were struck, the *Vizcaya* receiving five. The 6-inch gun, of which seven were in use, was the most disappointing weapon, for, notwithstanding its rapidity of fire, only three shots got home. The 5-inch gun did better, for each weapon in action managed to secure on an average two and a half shots to its credit. The 4-inch weapon did still better, the average being four shots per gun in use, but only three 4-inch guns were used. The one-pounder gun failed altogether owing to its range being limited to 3000 yards, while the average needed was 4500 yards. The 6-pounder gun was specially satisfactory, for of the 123 hits 77 are placed to its credit. Although the ratio is 1.83 hits per gun, probably the range was too long in many cases for this gun also. Only four guns were found subsequently to be defective owing to premature explosion consequent on rough internal surfaces of the shell, and for the future the interior is to be smoothened with shellac, as is done with many of our shells. The powder, too, is to be put into the shell loose. In all 32 shots passed through the berth decks, 43 through the gun decks, 9 through the superstructure, 10 through the funnels, 2 through the ventilators, and 2 through the masts. This has reference only to the Spanish ships.—*United Service Gazette*.

NOTES TO CAPTAIN BIRKHIMER'S ARTICLE ON TRANSPORTATION OF
TROOPS.

In the English Egyptian expedition of 1882, a force of 19,148 of all ranks, with 5908 horses, required a total gross tonnage of 140,000; say 100,000 net. Allowing for each horse 7 tons gross, this would be 98,444 gross tons for the troops, 59,067 net tons for others, or 3 tons net per man. This probably can be taken as a fair estimate of the British allowance. But the trip from England to Egypt is no such trying one as that from the United States to the Philippines; and, consequently, the allowance of space per man in the latter should, if 3 tons be a proper allowance in the case mentioned, exceed this amount instead of falling short as was our actual case.

A matter of great importance is to insist that men shall eat on deck and also stay there during the day as much as possible. It is conducive to cleanliness and good health. Even the man who prefers to stay between decks should be compelled to go above. There is generally less trouble in this particular with men who are quartered in the hold than with those higher up; but all, and equally, should be required to pass a great portion of their time in the open air. Men quartered in the hold generally regard themselves, especially in a tropical trip, as unfortunate; but, as they will generally, and of their free wills, stay as much as possible on deck, their lot may be happier in the long run than that of other men,

quartered mid-decks, but who prefer, instead of going out and breathing fresh air, to stay in the vitiated atmosphere of their bunks.

OTHER PEOPLE'S TROUBLES.

The experience of the recent manœuvres does not justify the hope that we are really progressing in one all-important department of army administration. Forty-four years ago our army fought splendidly in the Crimea, and won signal victories in face of every conceivable difficulty due to wretched administration. It was then, as it is now, a question of transport and supply. The departmental organization broke down completely, and as a natural consequence the troops in the field were subjected to a cruel ordeal. The result we know; that is a matter of history. We have lately mobilized two army corps for peace training and the same difficulties have arisen, though, of course, in a lesser degree. But the existence of the difficulty of which we speak must cause alarm, showing as it does how little our War Office has really profited by the lessons of the past. As it was in Crimean days so it is now, our generals are hampered by maladministration.

Whilst we are brought face to face with a very serious transport difficulty at home the Indian government has been obliged to assemble a large committee at Simla under the presidency of that able administrator, Lieut.-General Sanford, to inquire into the whole working of the transport system out there, it having been found to be most defective during the recent operations on the northwestern frontier. As in India so at home, the great obstacle to reform has hitherto been the question of cost. It requires operations as extensive as those of last winter, and a concentration on the scale of that which has been carried out this autumn in Wiltshire, to demonstrate that within reasonable limits no system can be more costly than that which on being put to the test is found inadequate. In the first place, to secure thoroughly efficient supply and transport services it is necessary to begin at the top and get first-class officers. More than one officer in command during the recent operations on the Indian frontier has expressed the opinion that supply and transport should be the first of all considerations if mobilization is to be anything more than a mere military term; that the duty in fact of those at army headquarters before everything else is to ask themselves, "Are our supply and transport arrangements what they ought to be?" Everything which has happened in a military sense during the last twelve months, the Northwestern Frontier War, the war between America and Spain, the Wiltshire manœuvres, and the taking of Khartoum, prove beyond doubt that there could be no more absurd policy than that which would cause some military administrators to say, "Oh, the departments are a nuisance, the departments must look after themselves. What we want is fighting men." Fighting men cannot be put into the field nowadays without perfect departmental systems to provide for their wants; if they are, disaster must follow. Against such a contingency it is surely the duty of military administration to guard.—*Army and Navy Gazette*.

Comment and Criticism.

"The Reorganization of Our State Troops."

General George W. Wingate.

FRANKNESS compels me to state that I am unable to regard the plan of Colonel Gilchrist as being either possible to be carried into effect as a whole or as being judicious if it could be. The scheme involves the wiping out of the existing National Guard system. As the States will never consent that this shall be done, the legislation without which any such radical change cannot be made will never be passed. But if it can be assumed that such legislation could be had, I am unable to see how the details of the plan could be successfully carried out. It is all very well to advise the raising of a National Guard in a State, the companies of which are to be kept at their full strength, to be composed of men who have passed the army physical examination (which is only possible where a small force is required), who are unmarried and who are so situated in business that they can leave to serve as volunteers (*i. e.* for two years in a foreign country) at the drop of a hat. The men cannot be had, and if they could be they could not be kept. So, too, the idea that the officers of such an organization must be twenty-five years old if second lieutenants, thirty if first lieutenants, and thirty-five years old if captains, is out of the question. Most National Guardsmen enlist about eighteen, when they are unmarried and are not much involved in business. But in a few years they either enter into business for themselves or rise to responsible situations. If only working men, they procure steady jobs. They marry and have a child or two.

The same qualities of brightness, energy and snap which make a good non-commissioned and commissioned officer make a man successful in business. Consequently the general rule is that the best officers and men in the Guard are those who have valuable business affiliations, and that those who have not are of very little account in a military sense. The very best officers are found among those from 21 to 25 years of age, and it will be remembered that Custer commanded 20,000 cavalry when he was but twenty-three, and General Ordway was a brigadier at nineteen. Does Colonel Gilchrist expect to discharge these men whenever they make a business engagement by which they can earn their living or whenever they marry?

The difficulty with the whole plan seems to me that it seeks to make a Regular army out of the National Guard. To provide an effective force which will be at all times under strict discipline, ready to spend two or three weeks annually in, or to enlist as volunteers for a prolonged period, which will perform garrison or field duty in or out of the country in either peace or war as need may require, and which will be freed from the entanglements of business and family relations, necessarily involves the establishment of a permanent Regular army. It is idle to talk about having any force which will do these things which is not composed of men who make soldiering the occupation of their lives. Any

such force which was not composed of Regulars would be a mere makeshift, and would be much more expensive than to increase the army itself. It is certain that it would not do the desired work.

The duty which the National Guard of the States is organized to perform is something entirely different. It is composed of men who give their service without compensation, who are engaged in business and who have families dependent upon them. Their services therefore must be confined to enforcing the laws in the various States, to respond to the call of the President in case of insurrection and invasion, and in particular to aid the Regular army "To hold the fort" in case of a sudden war until a force of volunteers can be organized. They also constitute a military training school, a sort of National West Point, in which the officers and men who will have to command the volunteers will receive their preliminary instruction. It is therefore important that they should be composed of intelligent and responsible men, not of a mere riff-raff without occupations or families.

Everything that Col. Gilchrist says in regard to the necessity of thoroughly equipping the Guard for service is correct. Both officers and men should be instructed in as much of the practical details of the art of war as is possible. But the very nature of the service and the character and position of the men who can be got to enlist, is diametrically opposed to the idea of their being at all times subjected to a call for any prolonged period of active service, particularly in a foreign country, except in the case of a great exigency, which demands the sacrifice they will make in engaging in such a service.

It is true Col. Gilchrist writes of paying them for the duty which they may perform while doing service in the Guard, but such pay is too insignificant to be considered as a factor in the matter. The men whom such pay would induce to enlist in such a service as he proposes, would be mere "floaters," here to-day and gone to-morrow, whom it would be impossible to organize into any stable force and who would be found missing at the time they were most desired.

One of the greatest military mistakes that has ever been made in this country has been the method which has been pursued in calling out the National Guard of the States to "volunteer." It is personally gratifying to me that I opposed it and did my best to secure the passage of the "Hull Bill." I trust that those National Guardsmen from Pennsylvania, Iowa and the West, who defeated the latter, have since seen the errors of their ways. They have certainly dealt the National Guard the severest blow it has ever received.

No one will dispute that politics ought to be kept out of the Guard. It is not however to be done by saying so. In many of the States, notably in New Jersey, no change is made in the officers, even of the general staff, in case of a change in the politics of the Governor. In New York State, until the coming of the present administration, there has been but little politics in the Guard. But if a Governor in his capacity as Commander-in-chief chooses to use his powers as a politician, he will do so and it cannot be helped.

Of course there is a good deal of difference in the efficiency of the Guard of the different States. Some of the latter have been unable or unwilling to organize their Guard upon military lines. The result naturally has been that the companies and regiments have been pretty poor soldiers. The fact that some organizations refused to volunteer unless allowed "to go as an organization" was not in my opinion a proof of want of discipline. Neither was it unmilitary.

The unmilitary thing about the matter was the asking them to volunteer. The Government had full authority to order them into service. If it did not choose to do this but asked them as individuals to volunteer to enlist in what was practically a different organization from the one they belonged to and for a kind of duty that neither they or any one else had ever contemplated that they would be asked to undertake, they were under no more obligation to do so than those individuals who did not belong to the Guard at all. In view of the fact that ten men were clamoring to be accepted where one was needed, I fail to see why any one who knew that his enlistment would mean financial ruin, or would leave his relatives destitute, was called upon to volunteer.

The information which I have received from those who were in the service is that the regiments from those States which maintained their Guard in good condition, were efficient. They were of course lacking in many things which are only learned in service. But they did not need much under proper instruction, to become good soldiers. The actual difficulty which prevented their receiving this instruction and which caused much suffering and the loss of many lives was the political and personal appointments not in the Guard but outside of it.

In respect to the method under which the Guard of a State should be organized, it seems to me that the system which New York State has recently adopted is theoretically about as good a one as can be devised. That State now has a major-general, an ex-West Pointer, who commands its entire force. His staff is the "General Staff." The Adjutant-General with the close of the present year, will rank a grade below the major-general and will lose most of his authority over the troops, at least as far as the law gives it to him. He merely keeps the military records and acts as chief of ordnance. In other words, he does the buying and issuing of supplies. It is instructing however to observe that although General Roe was in commission as commander of the National Guard of New York during its recent mobilization, and therefore was the proper person to have been entrusted with that important duty, that the Adjutant-General assuming to act in the name of the Governor as Commander-in-chief, took the control of everything. As he was destitute of military experience he made such a mess of the matter, that the Governor who had appointed and sustained him could not be renominated. In New York, officers and non-coms. have to pass a strict examination and recruits are examined physically before enlistment.

I am unable to approve of Col. Gilchrist's ideas in regard to the organization of the Guard except that it should be made similar to that of the army, which I think is correct. Adjutants and Inspectors of Rifle Practice should not be detailed officers but permanent ones. It appears to me that the Adjutant-General's office is properly a clerical one, and that he should be confined to those duties. For the same reason his assistants being without practical experience in the handling of troops would be the last men from whom regimental and battalion adjutants should be selected.

I fail to see why regiments should be broken up. In this State and in many others there are first-class regiments composed of separate battalions, and the organization works smoothly. The matter of examination of officers is or is not a farce in accordance with the military spirit of the different States. The method is certainly improving, and undoubtedly the experience of the recent mobilization will do very much to raise the standard.

The system of electing non-commissioned and commissioned officers is one

on which there is a great deal to be said. The difficulty arises in the first selection of corporals. It is for this reason that the system of lineal promotion does not always work well. A man may be a good corporal who is a poor sergeant and a wretched commissioned officer. The idea of giving a man a commission on probation is theoretically all right, but as a matter of practice it is very difficult to get rid of him after he has been commissioned. The method of requiring him to pass an examination theoretically and practically before he receives his warrant or commission is preferable. If it were possible to procure trained officers for the Guard, it would be most admirable, but where are they to come from? In England each regiment of volunteers (which answers to our National Guard) has a Regular officer detailed from the army to serve as its adjutant for a certain period, five years, I believe. He is under pay and gives his entire attention to the regiment, acting as adviser of the commanding officer, training the other officers, supervising the instruction and generally giving the whole regiment the benefit of his professional skill and training. This is of the very greatest benefit to the officers and men of the organization, and the plan could be adopted with great advantage in this country—if Congress would only give us enough officers.

Col. Gilchrist in his article says that the method he proposed "offers but little inducement for young men to enlist. Perhaps so, but we are to have a *military* force in the future, we hope, and the first essential is efficiency." The first proposition is clearly right. Theoretically the second may be. Nevertheless it is clear that in order to have a National Guard it is necessary to induce sufficient men and officers, not only to enlist, but to stay in the service. Under the plan proposed, I do not think they will do either.

General C. R. Boardman, N. G. Wis.

(Extract from Biennial Report.)

I would recommend the following: The remuster into the Wisconsin National Guard of such organizations from it that volunteered for the war with Spain, and which after being mustered out of the service of the United States desire to return to the Guard.

The reorganization of the Wisconsin National Guard to make it conform as nearly as possible to the United States army. The number of companies and battalions, and the number and grade of all officers in each regiment should conform to the provisions for the same in the laws governing the organization of the army when war exists. In Wisconsin there have been some eight and some twelve company regiments, the State law allowing but forty companies of infantry. There has been one more major and one more assistant surgeon in each regiment than are allowed in the United States army. In the State organization these extra officers should be dispensed with. Battalion adjutants should be detailed instead of permanently appointed, and the grade of regimental adjutants, quartermasters, and assistant surgeons should be that of first lieutenant instead of captain. It is not necessary to make the number of men to a company provided for by the United States Government in times of war, as that would make the total number of men greater than the State needs, but the Governor should be authorized in case of the outbreak of war and the use of the National Guard as volunteers, to order captains of companies to recruit up to the United States maximum. I believe also if the National Guard system is maintained, as I think it should be, not for State service alone, but as a part of

our national defense, that the State should strive to have the instruction of the organization placed more under the supervision of the United States Government. This, it would seem, might be done without interfering with the State's authority over the troops, in the following manner: Let the Government increase the annual appropriation which it now makes for the support of the National Guard of the various States, from \$420,000 to \$1,000,000 or \$2,000,000, and apportion this amount among the several States, as it now does, according to population. The sum that each State would thus be entitled to receive would be sufficiently large to make it an object, as a matter of economy, if for no other reason, for each to strive to obtain its share. Then let the Government establish certain conditions, conformity to which will be necessary on the part of each State, before its proportion of the appropriation can be secured. For the purpose of seeing that these conditions are adhered to, place the Guard of each State indirectly under the War Department, through the department commander of the department of the army in which the State is located, and let him, through his officers, inspect the Guard and report to the Government whether or not the conditions have been fulfilled. It could be left to the department commander to formulate the general scheme of instruction each year for the Guard of the States in his department; following this up with a detail of officers for the purposes of instruction, to work under State authority, both at the home stations of the companies and at the annual encampment. As another condition every officer ought to be required, as a part of the inspection, to pass such physical and mental examination as the department commander might think necessary to determine his efficiency and ability to hold the position to which he has been appointed. Enlisted men should be required to pass a medical examination before they are accepted into the Guard. Even with a large Regular army, in the event of a long, hard contest, recourse will have to be had to volunteers. In the present war comparison between the regiments from States with a good guard organization and those having almost none has shown the benefit that is to be derived from some previous training. Deprive the Guard from participation, as a duty, in the wars of the country, and one of the most important and best reasons for its existence is taken away.

Reviews and Exchanges.

Military Europe.*

AN interesting and profusely illustrated book results from the visit of General Miles to Europe and to certain of its armies during the spring of 1897.

Since the close of the Russo-Turkish War no opportunity for making observations on hostile forces in the field had presented itself until the outbreak of the Turks and Greeks. Diplomatic relations between these two countries having been severed, the author made hurried preparations for going to the field of contest, but the march of events proved more rapid than expected and on arriving at Paris he found that several engagements had taken place during his passage over sea. He proceeded at once to Constantinople as the best way of reaching the Turkish army, thirty thousand of whom were then in and about the city, giving an ample opportunity for observing the methods and condition of the forces.

The reforms initiated by Mahmud II. and carried out by Von Moltke and other German officers have produced their effect and the Turkish army is now completely modernized and on such a basis that the Sultan mobilized, armed and equipped 600,000 men without great effort in the spring of 1897. This force now numbers about 244,000 men, according to latest figures, and on a war footing would amount to 800,000.

"What I saw of the Turkish soldiers in Constantinople," writes the General, "convinced me that they are among the most effective in the world. There are many reasons for this fact. In the first place the Turks are a strong race, accustomed to hard labor, and consequently are easily moulded into enduring soldiers. They are all Moslems, and their religion has three elements which contribute largely to their soldierly qualities. First, it teaches them to believe in an absolute despotism; second it enforces simplicity of life and strict temperance; and third, it promises them unending pleasure in heaven as a reward for their endurance on earth. The long term of service required of the Turks adds of course to this effectiveness. It should not be forgotten, too, that this service has much of it been active. In the last hundred years Turkey has had a greater war record than any other nation in Europe."

Constantinople offers excellent opportunities for studying garrison life in the many barracks about the city. One valuable feature of all barracks is their accommodations for bathing. In the principal ones visited means for this purpose were so ample that at least forty men could enjoy the luxury of a Turkish bath at the same time.

The armistice had been signed the day of arrival at Constantinople, May 19. A greater contrast between the conditions at Athens and those at Constanti-

* *Military Europe. A Narrative of Personal Observation and Personal Experience* By Nelson A. Miles, Major General commanding the U. S. Armies. Doubleday & McClure Co. 1896. \$1.50.

nople could hardly be imagined. The author had left a well-fortified city, the headquarters of a strong military administration, evidences of vast resources, both in disciplined men and system of supplies, a people proud of victory, a government confident because of success; he came to a city exposed on every hand, deficient in military resources, its government dejected by defeat, its people dissatisfied with their rulers and divided in their opinion of what had been or should be done.

What this people were suffering was the only possible result to be expected from an unaided struggle against such a highly organized military power as Turkey.

Near Lamia the Greek army lay camped in three grand divisions, the third in advance in order of battle. Immediately in front, at about 400 yards distance, lay the Turks, the graves of the fallen scattered in between.

The poor Greeks were without shelter, and exposed to inclement weather, while the Turks occupied the captured tents, the independence and bravado of the latter clearly indicating their readiness to renew the conflict the moment the armistice was suspended. The humiliation that follows defeat and retreat pictured itself plainly upon the faces alike of officers and men among the Greeks, whose condition was rendered all the more melancholy by the presence of great numbers of refugees—some claim 50,000—wandering about from place to place, homeless and destitute.

Our author concludes his clear-sighted and interesting observations on the characteristics of both armies by a graphic description of a visit to the famous Pass of Thermopylæ and then proceeds to relate his experiences at the Jubilee in honor of the sixtieth anniversary of the accession of Queen Victoria to the throne of Great Britain.

The military and naval glory of England, as exemplified by the Jubilee reviews, receives full appreciation at our author's hands. The description of a review at Aldershot gives us a taste of his quality.

"July 1st was a bright, beautiful day. The field where the review took place was not large, but it was covered with a strong green English turf, and, with the forests and rolling hills in the background, made a perfect place for a display of troops. About 28,000 men assembled for review, of whom 1000 were colonials. The scene was one of indescribable brilliancy, because of the great variety of uniforms and the splendid equipment and discipline of the troops. I was very much impressed by the strong colors of the British uniforms, now that I saw them massed. On a single soldier one does not notice this particularly, but in large bodies the black, green, scarlet, and blue are wonderfully bright and effective. To the beauty of the day and brilliancy of the troops was added the best and most inspiring music I heard in Europe. The pipes of the Highlanders and the splendid military bands of the English and Irish regiments were equal to any I ever heard. Mingled with the national airs, such as 'British Grenadiers,' the notes of some of Sousa's best marches greeted my ears again as they had done in Constantinople.

"The colonials were given the place of honor in the review, that is, they were the first to march before her Majesty. They formed a picturesque sight as they passed rapidly across the field at Aldershot and wheeled into position at the left of the Queen. As soon as they had taken their places, the Regular troops marched past in divisions. They were then massed and moved past in line of brigades; then the cavalry and artillery charged past at a gallop; and at the

close, the entire army of 28,000 men formed on the opposite side of the field from her Majesty and moved in one solid body across the field and halted in perfect line within a hundred yards of her carriage. All the bands struck up 'God Save the Queen' and the entire body shouted 'Long Live Victoria.' Thousands manifested their enthusiasm by placing their hats upon their bayonets and swords and waving them in the air, making it one of the greatest demonstrations of loyalty and devotion that could possibly be shown by an army towards its sovereign."

The autumn manœuvres of Europe we all know are of deep and important interest to military students. Many important lessons, regarding not only the tactical formations of troops, but also all kinds of equipments, the quickest and safest means of transportation, and the food best adapted for troops while in actual service, have been learned from observations made by military men during these manœuvres. Many of the modern appliances of war have first been tested in these campaigns and their use exemplified. All this aside, however, the benefit derived from athletic training of men, the discipline of field service and the power of handling large bodies of men are probably a sufficient reward for the time, money and energy spent in organizing and carrying out these manœuvres.

Our author was especially fortunate in having opportunity to witness the manœuvres held at Krasnoe-Selo, near St. Petersburg, the Kaiser manœuvres in Germany and those which took place in the north of France.

The camp and surroundings of Krasnoe-Selo are well described, the church fête and review being especially interesting.

The manœuvres followed, the troops being those of the Guard Corps, in all about 35,000 or 40,000 men.

"It was a beautiful country for such a manœuvre. The place where we were to rendezvous and where the Emperor was to repair was on a high point from which we could see the country for miles around, and which formed the key of the position held by the northern force.

"The use of cavalry as practised in the Russian army was well shown here, as a large force with several horse batteries, was rapidly sent forward to dismount and occupy this hill and hold it until the infantry forces from the north, coming down in two large columns, should arrive. The batteries had just been placed in position when the advance of the southern force was seen approaching, the forces proceeding in long columns covered by cavalry, while away to the front patrols could be seen moving. The northern army having occupied its line of battle, the cavalry moved off to its left. Shortly afterward the cavalry of the south could be seen rapidly approaching; when a charge was made, the two cavalry columns meeting. It was all exceedingly interesting, resulting, however, in the defeat of the northern cavalry, which retired and reformed some distance in rear. Heavy artillery firing now commenced from the south. It was kept up for a long time, and in actual war would have been very severe. This was replied to by a number of batteries well stationed along the line of defense. The attack was then delivered by the southern force in regular order, line after line advancing to the attack well supported, according to the modern attack formation. Fire was kept up all along the line for perhaps an hour, when at last the northern force charged, each line passing through the other, then recall sounded.

"The Grand Duke Vladimir ordered the general plan of operations day by

day, but great latitude was left to commanding officers, and they are invited, as is the custom in foreign armies, to show originality and energy in carrying out their special movements."

After a pleasant visit to Herr Krupp's factories the General proceeded to Hamburg, where he witnessed the review of the 11th Army Corps and later the manoeuvres of 117,000 men of all arms assembled for this purpose. Many miles were covered by these troops—long and weary marches, for much of the time it rained—in accomplishing the various movements. In fact, except for the dangers of war, perhaps the troops suffered as much hardship as they would in actual campaign, and yet they seemed well supplied and there were few accidents.

At St. Quentin the General witnessed the manoeuvres of the French troops which took place in the same country upon which certain campaigns of 1870-71 had been fought, and the general idea of these troops was to illustrate the methods that would be taken to resist an invading army under circumstances similar to those which obtained during the last war.

"I was much impressed," writes our author, "with the discipline of the French troops. Their dispositions for attack and defense seemed to be characterized by exceedingly good judgment and ability. Tents were not used, the troops being billeted in villages, which, being so numerous in France suffice to accommodate large numbers. A similar arrangement is made in Germany, although the troops there are supplied with shelter-tents, which are made of pieces as with us; but while our tents accommodate only two men, each carrying a half, in the German army a large number can be supplied by putting together the necessary pieces."

The bicycle corps at the review which followed attracted particular attention. It had been much used both in this and the manoeuvres of the previous year.

The men were provided with a folding wheel which could be placed on the back and carried with ease.

The wheelman wears the ordinary uniform with the addition of a pair of leggings and carries his rifle in addition to the usual repair kit. The roads of France are ideal ones for wheeling and the French claim that the experiments prove the value of the bicycle in military operations for reconnoitring purposes, especially with cavalry and horse artillery. The rapidity and silence of its movements are important points in its favor. The company of cyclists in the manoeuvres of this particular year were termed the "phantom company" because they so unexpectedly and silently appeared before the enemy.

The book makes agreeable reading, while the excellent paper, wide margins and clear, large type present a most pleasing appearance to the eye.

J. C. B.

Announcement.

IN order to facilitate the prompt delivery of the
JOURNAL, members are requested to notify this
office of every change of address.

Prize Essay of Infantry Society

FOR 1899.

"The Infantry of the United States Army. How
Should it be Recruited, Equipped, Organ-
ized, Supplied and Utilized."

Essays should be in the hands of the Secretary and Treas-
urer, U. S. Infantry Society, Fort Leavenworth,
Kansas, before January 1, 1899.

The conditions of the competition can be learned from the
Secretary.

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NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues include Journal.

Changes of address should be reported promptly.



Prize Essay—1898.

I.—The following Resolution of Council is published for the information of all concerned :

Resolved, That a Prize of a Gold Medal, together with \$100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and \$50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September 1, 1898.** The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize*; and also in their order of merit those deserving of honorable mention.
In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.
4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.
5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1897, for the Prize Essay of 1898, is

“OUR WATER BOUNDARIES AND OUR INTERIOR
WATER-WAYS; HOW TO UTILIZE AND DE-
FEND THEM; THEIR INFLUENCE IN CASE OF
INVASION.”

III.—The gentlemen chosen by the Council to constitute the Board of Award for the year 1898 are :

REAR ADMIRAL BANCROFT GHERARDI, U. S. N.
BRIG. GENERAL WILLIAM P. CRAIGHILL, U. S. A.
HONORABLE JOSEPH H. OUTHWAITE.

GOVERNOR'S ISLAND,
Nov. 1, 1897.

JAMES FORNANCE,
Secretary.

* Time has been extended to January 1st, 1899.

